

JAMAICA

ANNUAL REPORT

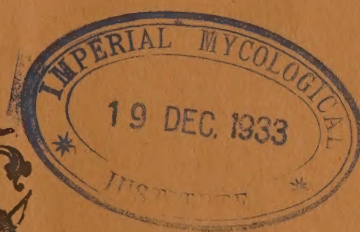
OF THE

Department of Agriculture

FOR THE

YEAR ENDED 31ST DECEMBER, 1932

Ordered by His Excellency the Governor to be printed.



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CONTENTS.

	<u>PAGE.</u>
I. GENERAL OBSERVATIONS. 	1
II. PUBLIC GARDENS. 	5
III. AGRICULTURAL EXPERIMENTS:	
(a) Experiment Station, Hope.	10
(b) Irrigation Experiments, Pedro Plains. ..	12
IV. DISEASES OF ANIMALS.	12
V. PLANT DISEASES AND PESTS.	
(a) Advisory Committee on the Banana Industry. ..	12
(b) Report of Government Microbiologist. ..	13
(c) Report of Government Entomologist. ..	16
VI. PLANT BREEDING.	
(a) Report of Geneticist. 	18
(b) Report on Breeding Bananas.	19
VII. AGRICULTURAL EDUCATION.	
(a) Government Farm School, Hope. 	20
(b) Grove Place Farm and Experiment Station. ..	22
VIII. LIVESTOCK. 	23
IX. CHEMISTRY.	
(a) Government Laboratory. 	31
(b) Agricultural Chemistry. 	36
X. STAFF. 	40

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LIVE STOCK.

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Foremen Hope Stock Farm	..	..	..	..	G. E. Redshaw, R. A. Amiel.
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DEPARTMENT OF SCIENCE AND AGRICULTURE.

Report for the year ended 31st December, 1932.

I.—GENERAL OBSERVATIONS.

The rainfall in the year 1932 was not so heavy as in the previous year although there was a precipitation of 75.97 inches (2.33 inches above the 60-year average). Unfortunately this rainfall was not well distributed in most districts and a sharp drought in St. Mary, Clarendon and an even more protracted dry spell in the west end of the Island had an effect upon the banana cultivations and the quality of the fruit produced.

The outstanding feature of the year was the hurricane which made a semi-circle round the Island in November. While most districts only received the force of the outer part of the cyclone, yet damage to crops generally was severe. The full effect of this storm will not be felt, in regard to production, until 1933. While all parts of the Island suffered to some extent, the maximum damage took place in the west end, centre and north of the Island. In other areas the damage was irregular while some portions of the southern parishes were scarcely affected at all.

The effects of the storm have once more brought home to the Jamaica planter the folly of not having a second string to his agricultural bow, for while bananas were almost universally damaged throughout the Island, in some cases damaged to the extent that no further crop can be expected for 12 months, other crops such as citrus, coconuts and sugar cane suffered only small losses in comparison. This factor has helped to foster the growing interest in citrus as an important secondary crop in the Colony.

With a few exceptions market prices for Jamaica products improved slightly in 1932, several items of export having shown increased values. With the aid of the co-operative organisations the Jamaica planter is weathering the storm of depression and will be in a strong position to take immediate advantage of improving markets when the world trade crisis is over. It has to be acknowledged that but for the co-operative organisations established during the past 6 years the agricultural community of Jamaica would have been in serious difficulties and would not now be in the relatively strong position which it holds in spite of world-wide depression and universal agricultural stagnation.

Bananas.—The storm of November 9th had a disastrous effect upon the export of bananas, which up to that time had been in excess of the previous year and gave promise of reaching 23,000,000. The storm struck the western end of the Island with hurricane force, continued along the north coast, levelling the banana fields almost completely, except in small well protected districts. The irrigated areas in the south of the Island escaped serious damage and the losses in Saint Andrew and Saint Thomas were irregular. Apart from these districts the losses were severe not only among the mature trees but also among the young following suckers. At the time of the storm, moreover, there was a shortage of bananas in the World's markets thus intensifying the loss to the planters, especially in the western parishes, where a very fine crop of heavy fruit was hanging which would otherwise have sold at good prices. The exports were immediately affected but for some weeks considerable quantities of fruit were obtainable from trees only partially blown down. By the end of the year however, there was very little fruit obtainable and the weekly exports dropped to a small fraction of the normal. The damage from hurricane was intensified by a sharp drought which lasted throughout the winter delaying recovery in the plantations.

Timely action by Government in introducing a Bill at an emergency meeting of the Legislature to assist banana planters with loans relieved the situation considerably among the small settlers and those planters who had not covered their crops by insurance.

The total exports for the year 1932 amounted to 20,360,613 stems or 13,764,020 count bunches, valued at £1,809,111, as compared with 22,335,605 stems exported in 1931,

The world-wide depression had its effects upon the markets for bananas and this was most marked in the United States and the markets on the continent of Europe. In Canada too, the price and the demand was poor but a temporary arrangement was made between all the Fruit Companies by which the shipments to Canada were pooled and excessive competition eliminated. The effect of the preferential tariff concession given by Great Britain to Empire bananas in the 1932-33 Budget was immediate and resulted in a large proportion of the Jamaican fruit being diverted to this market. In consequence of this and the rates of exchange with America, the planters have received a reasonable though not a high return for their fruit.

Panama Disease has continued to devastate the banana fields in all parishes but it is pleasing to note that the percentage increases in the number of diseased plants over the previous year (26%) was smaller than that of 1931 (31%) and a marked decrease on the peak percentages of 1929 and 1930 when 115% and 100% were recorded. 121,722 diseased plants were recorded, representing together with the healthy bananas destroyed in the quarantine system of treatment of the disease, a loss of some 1,700 acres of good banana land during the year.

The steady progress of the Panama Disease is giving concern generally to the Banana Industry as it is anticipated that at the present rate of increase the disease will begin to have an effect upon the exports within 5 or 6 years, an effect which will be very noticeable by 1940. This reduction in production can only be very partially offset by the planting of new lands and in consequence the need for a banana of marketable quality yet immune to the disease becomes more imperative each year. This fact is well recognized by the Legislature and as a result an initial Vote was granted to the Department of Agriculture in December for the purposes of initiating a scheme for developing the immune bananas already produced from the breeding project so that they might be subjected to normal commercial tests both in the field and in cold storage. This scheme also involves the production from central nurseries of high class budded citrus plants for the purpose of reclaiming lands lost from Panama Disease.

The approved mineral oils mentioned in the Report for 1931 have continued to be used with great success for killing banana plants *in situ* in connection with the quarantine system of disease treatment and with a considerable reduction in the expense involved.

The work of breeding an immune banana to replace the Gros Michel has been continued by the Super-vising Inspector of Plant Diseases, but the work has suffered some interruption by the losses of standing trees in the experimental plantations as a result of the hurricane. The newly appointed Geneticist whose laboratory has been equipped by a free grant from the Colonial Development Fund, arrived towards the end of the year and it is hoped that cytological investigations of the hybrid and parent bananas will ultimately result in scientific direction of the breeding work to effect a more rapid production of hybrids with desirable characteristics.

Sugar.—There has been general regret that the prices in the world's markets for sugar have shown no marked improvement during 1932, although our exports have been mostly to Canada where the exchange has been in our favour. The export market for rum has also continued in a state of semi-stagnation.

The total crop was somewhat larger than in 1931, there being 58,500 tons produced as compared with 50,155 tons in 1931. This increase in tonnage is attributable largely to a greater effort on the part of the planters to increase their yield of cane per acre by higher cultivation and utilising the heavy yielding varieties which have been distributed by the Department of Agriculture in recent years. For similar reasons and increased planting, the crop in 1933 is likely to be even larger than in 1932.

In spite of the present low prices, several estates are gradually extending their cultivations in order that the factories may work more nearly to their full capacity and so reduce the overhead expense on each ton of sugar manufactured.

On the whole there is a more optimistic tone in the local industry, since, in spite of low prices abroad, estates are now able to show a small profit. This is the result of the tariff concessions given by the Secretary of State in the 1932-1933 Budget in the form of 1/- per cwt. additional preference on Colonial sugar and the granting of the Extra Special Imperial Preference Certificates, coupled with the advantage gained from the action of the Legislature in obtaining for the local factories the benefits of an assured and profitable market within the Island for at least 20% of the crop. The securing of this profit necessitated the revision of the price of sugar for local consumption during 1932 to offset the depression in export prices. Jamaica received Extra Special Imperial Preference Certificates to the extent of 19,400 tons of the 1931-32 crop. These Certificates being transferable and the Jamaica export market lying chiefly in Canada, advantage was taken to sell these certificates to Mauritius for cash. This money will be distributed to the planters in proportion to their average production over two seasons and will work out approximately at 8/- per ton of sugar exported or 6/- per ton produced.

The additional preference of 1/- per cwt. granted to Colonial sugar in the 1932-33 Budget has not affected Jamaica directly as the bulk of her exports are to Canada but it has had the indirect effect of maintaining the Canadian Market at the standard of that of London in order that supplies might not be diverted. The industry, has, therefore, had the full indirect benefit of this preference.

The formation of the Rum Pool in 1932 has restricted production and prevented the over-production of rum for local consumption and the consequent price-cutting which would have been the natural sequence. Exports have also been regulated and each estate has been able to obtain its fair share of the small market which is now open to the product.

The exports in 1932 amounted to 181,469 gallons, valued at £21,519, this being a considerable falling off from the 490,000 gallons exported in 1931.

In view of the preceding remarks it appears that the Sugar Industry in Jamaica is in as strong a position as is possible under the present state of the world's supplies of sugar and rum, and each estate is participating in the benefits accruing from local assistance and Imperial preferences. It is expected with the continuation of these aids to the industry and the co-operative measures adopted by planters that a small profit will be shown in the operations of 1933.

The cultivation of the recently imported P.O.J. Seedlings has extended and it is interesting to note that the 'wonder cane' of Java P.O.J.2878 has in one instance given a crop of 106 tons to the acre. The cane, however, has not yet shown itself to be adaptable to all classes of Jamaica soils.

Coconuts.—The exports of the fresh nuts in 1932 increased by nearly 3,000,000 to 39,235,811 but this increase was partially offset by a reduction in the export of copra from 3,522 tons in 1931 to 2,883 tons in

1932. Values generally were much lower than normal but nevertheless the Jamaican products were saleable without great difficulty in spite of a world over-production of vegetable and similar oils.

The Co-operative Organisation completed the first portion of its factory and started operations during the year. With the assistance of a protective tariff and a "Control Board" to regulate supplies and prices this factory is turning out edible oils of very high quality which have received a market in the Island and the general approval of the consuming public. As a result of this development a considerable quantity of copra will be retained for local consumption while only the classes of nuts which are in demand in the foreign markets will be exported. The local soap industry has continued to progress and several brands of soap of good quality are now on the market.

The coconut meal bye-product of the oil and soap industries has found a ready local market for cattle feed especially during the winter and spring months and occasional supplies have been exported at fairly good prices.

There was a widespread leaf disease of coconuts apparent in the parish of St. Mary and adjoining districts in the earlier part of the year. An investigation was made by members of the Department of Agriculture and it was shown to be a non-infectious trouble caused by the accumulated effect of adverse weather conditions over a series of years. With the advent of more normal seasons the disease is steadily disappearing.

Logwood and other Dyewoods.—The trade in these commodities has remained in a state of semi-stagnation. The price of wood improved slightly but the demand did not increase appreciably. The total exports of logwood amounted to 19,258 tons valued at £55,230 f.o.b.

The manufactured extract showed a very marked decrease from 8,423 to 5,316 packages, the latter valued at £57,938. The exports of Fustic amounted to 1,465 tons valued at £5,120.

Coffee.—Prices improved slightly for the better grades of Jamaica Coffee. The production remained about the same as in the previous year, the exports amounting to approximately 8,877,455 lbs., valued at £224,057. It is pleasing to note the steady improvement in the curing of the "ordinary" grades of this product which has helped to maintain the sales for the Jamaican article.

Cocoa.—The popularity of this crop among planters continues to diminish in Jamaica with the steady weakening of prices during recent years. In spite of a small improvement in values over the previous year, the exports were small and amounted to 43,757 cwts., valued at £48,102, against a total export of 52,899 cwts. in 1931. No considerable improvement in the production of the commodity can be expected unless there is a clear indication of a stronger and steady market and in the meantime interest has waned in this crop and plantations are being neglected as the ruling prices do not cover the cost of production.

Ginger.—There was a further drop in the production of ginger in 1932, the exports falling from 17,833 cwts. to 14,834 cwts. Values improved considerably however, that of the exports amounting to £35,678. This is partly due to a stronger market and partly to an improvement in the preparation and grading of the product. Practically the whole of this crop is grown in a few limited areas by small settlers as the labour involved in its preparation does not permit of its extensive planting on large estates.

Citrus Fruit.—The improvement in the production and exports of these fruits, especially oranges, has been the outstanding feature of the year. The protection to both oranges and grapefruit in the Canadian market has assisted in the revival and steady development of trade with the Dominion. The Jamaica Citrus Producers' Association have extended their activities during the year and have been responsible for a large proportion of the increase in exports. The difficulties encountered with Stem End Rot in the previous season have been largely overcome as a result of the scientific investigation by the officers of the Department of Agriculture and consequently although prices have not ruled very high there has been a steady demand for the Jamaican products at a fair price. Interest in the U. K. market has increased and all-the-year-round preferential tariff on Empire grapefruit has been appreciated and has resulted in increased shipments but at only fairly remunerative prices to the markets in Great Britain. The seasonal preference given to Empire oranges unfortunately does not coincide with the season of maximum production in Jamaica and thus has not resulted in any considerable diversion of supplies of this fruit to the London markets.

The revived interest in citrus growing is becoming very apparent in Jamaica and its value is being appreciated as a secondary crop to bananas, especially in those areas seriously affected by Panama Disease of bananas. At the close of the year a small preliminary Vote was given by the Legislative Council for the establishment of large nurseries for the production of budded plants of standard varieties. It is anticipated that the distribution of some thousands of high class plants over a period of 3 or 4 years will be of material assistance in establishing Jamaica citrus in the better class markets and in giving the banana planter a "second string to his bow." There are very few districts in the Island which are not capable of producing citrus fruits of good quality and, with a few exceptions, the banana lands lost from the inroads of Panama Disease appear to be largely adaptable to the crop.

The exports of oranges in 1932 reached 92,736 boxes valued at £45,171 as compared with only 35,545 boxes in 1931. Grapefruit showed almost as good an improvement with 141,221 boxes valued at £70,848 as compared with 100,153 boxes in 1931. There was a slight improvement in the quantities of lime juice exported—36,240 gallons as compared with 32,318 gallons in 1931, while 4,580 barrels of limes were exported as compared with 3,359 barrels in the previous year. The export of orange oil dropped from 9,313 gallons in 1931 to 8,552 gallons in 1932. This however, can be accounted for in the increase in the exports of the fresh fruit.

Through the collaboration of Dr. Myers of the Imperial Entomological Institute, the Malayan "*Wasp*" *Eretmocerus Serius* which parasitises the Black Fly *Aleurocanthus*, was imported from Cuba by airplane. The original colonies were developed by the Entomologist and released where observation could be made. The results have been extremely satisfactory and the parasite is rapidly proving its remarkable efficiency. The thanks of the Department and the citrus planters is due to the Institute for assisting in importing this beneficial insect.

Honey.—The exports showed a slight increase to 2,049,169 lbs. or about 145,407 gallons valued at £13,803. Prices on the whole showed an improvement, partially, no doubt, on account of better handling, grading and packing of the product. The abundance of available nectar and the good flavour in general of the Jamaican honey, especially that derived from logwood, should, when markets become more stabilised,

result in a considerable increase in the production of both honey and wax. The subvention to assist the Bee Industry by demonstration and the distribution of good queens has been continued and was appreciated by those concerned.

Pimento.—The low prices prevailing and the abundant supplies still in the markets, resulted in only a portion of the crop being gathered. As a result only 73,909 cwts. were exported as compared with 109,059 cwts. in the previous year. That for the year 1932 had the very low valuation of £61,687. Consequent upon the weakness of the market for this product the recently formed Co-operative Marketing Association has not yet been able to get into its full stride.

Tobacco.—There was a further slight drop in the export of cigars to 47,525 lbs. valued at £29,421. Local manufacturers of cigarettes from imported Virginia leaf, in some cases blended with locally grown cigar leaf, has increased. The utilisation of the local leaf for this purpose is very limited on account of the general taste in cigarettes.

The manufacture of "Jackass-Rope" for a cheap pipe smoking tobacco, has continued to flourish and is a source of fair revenue to the settlers of St. Elizabeth who peddle their product throughout the Island.

Fibres.—The small local industry in sisal production has continued to supply the needs of the local market with good quality ropes at a moderate price. As a result the exports have been negligible as most of the crop has been utilized within the Island, the industry being aided by the imposition of a tariff on imported ropes.

Timbers and Wood.—The exports of these products have, as usual, been quite small. Such cabinet and hardwoods as are produced are mainly utilised within the Colony. Small quantities of Ebony, Lignum Vitæ and Satinwood were exported amounting to some 500 tons in all. Bitterwood (quassia) exports fell off as compared with the previous year to 718 tons valued at £1,257. An enterprising local firm which makes bitterwood chips, has continued to find a fairly good market for its product.

Livestock.—Animal diseases of a serious or epidemic nature have been almost unknown during 1932, although occasional severe cases of tick fever have occurred. When taken in time these have responded to treatment with Trypan Blue.

It is unfortunate that the investigation into the possibilities of exporting beef cattle to Trinidad did not materialise into any definite or practical scheme. The difficulties and expense incidental to such a trade have however, proved for the present to be too great. This was a great disappointment to the penkeepers as there is now a surplus of high class beef cattle in the Island.

Efforts are being made by a group of St. Ann penkeepers to improve their returns by co-operative marketing of beef direct to the consumer. Cold storage facilities have recently increased in the city of Kingston and a certain quantity of cold stored local beef is now sold both to ships and to those local consumers who prefer meat which has been "hung" to the very fresh beef which is the usual rule.

The extension of the local dairy industry has continued and with the aid of Regulations it is steadily reaching a much higher standard. In some areas milch cows are regularly tested for tuberculosis.

The Government Stock Farm at Hope and the Government Stud Farm at Grove Place have had successful years and the improvement of the cattle of the Island as the result of the sires distributed from these centres becomes more apparent each year. No better proof of the public's appreciation of these two institutions can be required than the long waiting lists for bull calves at Hope and the number of animals sent to Grove Place for service each year. The addition of small stock at Grove Place has been immediately appreciated and the stud animals are in great demand.

The export of goatskins showed a slight drop to 173,220, while hides of cattle dropped from 17,025 to 10,140.

AGRICULTURAL EDUCATION.

The first full year of the re-organised system of education at the Farm School proved very successful although on account of the depression, the number of students was considerably below the full capacity. The new branch in association with the Grove Place Stud Farm has proved a valuable asset and the students have been able to increase their knowledge of practical agriculture in association with the new experimental station at this Farm. The extension of the school's activities in this direction should result in a far better trained "graduate" than was possible under the old system when the possibilities for training in budding and the cultivation of crops were decidedly more limited.

CO-OPERATIVE MARKETING.

The co-operative movement has continued to progress during 1932. The Banana Association acquired an additional fast ship during the year and this steamer has proved its value by reducing operating costs and expediting deliveries as well as making possible more frequent services to Great Britain and the Continent of Europe. The Standard Fruit Company has also placed a new steamer in their service and so added efficiency to the whole project.

The membership of the Association has increased and but for the hurricane and the weak state of the American markets, the year would have shown a very considerable increase in the Association's previous records. Nevertheless, in spite of low prices the members received from the pool a price per count bunch which left a fair profit after the deduction of cost of production.

This enterprise of the Jamaica banana growers has been one of the world's outstanding successes of co-operative agricultural marketing.

Outstanding progress in the marketing of citrus has been made by the Jamaica Citrus Producers Association during 1932 and the large increase in the exports of citrus fruits are mostly due to this organisation. The membership has increased and the Packing House has been extended but even so during the peak periods of the season its capacity has been strained to the utmost. The difficulties encountered during the previous season from losses by Stem End Rot were successfully overcome by the installation of the system recommended as a result of the investigations by the Microbiologist and no serious losses from this disease resulted in 1932.

The Jamaica Coconut Producers Association started full activities with the new factory during 1932 and have produced a high class edible oil. (vide Coconuts). The manufacture of soap at this factory is now under consideration.

The Pimento Organisation has not yet been able to get into its full stride on account of the financial conditions in the consuming countries, but it is hoped that with a return to more normal conditions this Association will meet with the same success which has been attendant upon the efforts of the other branches of the co-operative movement.

A further co-operative association for the marketing of vegetable and small fruits was organised during 1932.

The success of the co-operative movements in the Colony has made a great impression on its own planters as well as on those abroad. In fact, Jamaica is steadily becoming "co-operative minded" and the latest result of this is the joint marketing of beef direct to the consumers by a group of penkeepers.

DEPARTMENTAL ADMINISTRATION.

After a period of 31½ years service in the Colony, the Director, Mr. H. H. Cousins, M.A., left the Island in June and finally retired from the Service in September. The retirement of Mr. Cousins, who has been in charge of the Department since its inception as a Department of Agriculture, was a great loss though it is pleasing to record that every effort has been made to maintain the policy in those branches of the Department's activities which the former Director had expended such great energy in bringing to such a high standard. The detailed history and records of the Hope Stock Farm, where tropical dairying and cattle breeding have been brought to a very high standard, was completed by Mr. Cousins before his retirement. The volume is now in the Press and its publication is awaited with interest.

Dr. S. Lockett, Government Veterinary Surgeon, acted as Director of Agriculture after Mr. Cousins left the Island.

The Colony was visited by Mr. F. A. Stockdale, C.M.G., C.B.E., Assistant Agricultural Adviser to the Secretary of State, during April. This visit lasted some two weeks, during which time Mr. Stockdale visited many sections of the Island in the company of various officers of the Department. Facilities were also obtained for the visitor to inspect the numerous industries of the Island connected with agriculture and for him to confer with the several co-operative organisations. The advice and suggestions put forward during this visit coupled with the report which has since been published, were stimulating and of great value in defining departmental policy.

F. E. V. SMITH, B.Sc.,
Acting Director of Agriculture.
June, 1933.

II.—PUBLIC GARDENS.

Report of the Superintendent and Horticulturist.

1. HOPE GARDENS.

Orchids.—Considerable progress has been made during the year in establishing thousands of seedlings of Hybrid Cattleyas from the asymbiotic culture to the natural culture. To cope with this new feature of horticultural work at Hope, a specially constructed plant house was erected to house the young seedlings after they are transferred from flasks to clay pots containing a specially prepared mixture of finely chopped tree fern and peat fibre. The object in view in constructing this house was to keep insect life away from the small seedlings in the early stages of growth. Our efforts in that direction have been very successful and there are now thousands of young seedlings past the dangerous age and ready to be moved into 3" pots.

The following is a list of the seedling crosses established under natural conditions and the names of the crosses as recorded in Sander's List of Orchid Hybrids. It will be noticed that there are several of the crosses made at Hope which have not yet been recorded.

No.	Parentage.	Name.
14.	C. Dowiana x Bc. Thorntonii ..	Bc. Betty
15.	C. Dowiana x C. Gaskelliana ..	C. Lord Rothschild
16.	C. Dowiana x C. Hardyana fegalis	C. Prince John
17.	Slc. Magnet x C. Miss Measures	(Not recorded)
18.	C. Miss Measures x Bc. Pallas	Do.
20.	Lc. lustrissima x C. Maggie Raphael alba	Do.
21.	C. Dowiana x Bc. Olympus ..	Do.
23.	C. Dowiana x Bc. Pallas ..	Do.
27.	C. labiata x Bc. Mrs. J. Leeman	Bc. Ruby
36.	Lc. Dominiana x C. Hentschelii	(Not recorded)
38.	C. labiata x Lc. Mrs. Medo ..	Do.
39.	C. labiata x C. Marriottiana ..	Do.
41.	C. Hentschelii x Lc. Dominiana	Do.
44.	C. Dowiana x C. Miss Measures	Do.
46.	C. Dowiana x Lc. Gabrielle Petit	Do.
47.	C. Dowiana x Lc. Gabrielle Petit	Do.
48.	C. labiata x Lc. Isabel Sander Ashlands var.	Do.
49.	C. Dowiana x Lc. Martinetii ..	Lc. Hector
50.	C. Dowiana x C. gigas ..	C. Hardyana
51.	C. Dowiana x C. Aumania ..	(Not recorded)
52.	C. Mossiae x Lc. Canhamiana alba	Lc. Isabel Sander

No.	Parentage.	Name.
53.	C. Mossiae x Lc. Dominiana	Lc. Domos
55.	Broughtonia lilacina—Selfed	
62.	C. Dowiana x Bc. Mrs. J. Leeman	Bc. Minerva
67.	C. Dowiana x C. Maggie Raphael	C. Bellona
69.	Phalaenopsis Rimstadiana—Selfed	
75.	Bc. Mme Chas. Maron x C. Empress Frederick	(Not recorded)
77.	Lc. Canhamiana x C. gigas F. M. Byrodt	Lc. Britannia
78.	C. Labiata x Schomburgkia Thomsonii	(Not recorded)
90.	Lc. San Juan x C. gigas F. M. Byrodt	Do.
91.	C. labiata x C. Dowiana	C. Fabia
96.	C. gigas—F. M. Byrodt x C. Hardyana var. regalis	C. Eleanore alba
109.	Epidendrum Schomburgkii—Selfed	
112.	Vanda Sanderiana x C. coerulea	(Not recorded)
113.	Lc. Aulange x C. Adula var. vivid	Do.

The Microbiologist continues to raise seedlings on his specially prepared media and the following is a list of the successful crosses made during the year and sent to the Microbiologist.

C. labiata x C. Dowiana
 C. gigas—F. M. Byrodt x C. Hardyana var. regalis
 C. labiata x C. Fabia brugense
 C. Dowiana aurea x C. gigas F. M. Byrodt
 C. Mossiae x C. Dowiana
 C. Enid alba x C. Dowiana aurea
 C. Mossiae x Lc. Canhamiana alba
 C. labiata x C. Adula var. vivid
 C. Gaskelliana x C. Enid alba The Queen
 C. Fabia alba x C. Mrs. Medo
 C. labiata x C. Hardyana var. H. H. Cousins
 C. Dowiana X Lc. Bletchleyensis
 C. labiata x Bc. Marguerite Fournier
 C. Kienastiana x Bc. Crofutiana
 C. Luedemanniana x C. Enid
 C. Hardyana x Lc. Britannia
 Bc. Rann Lee x C. Trianae var. regina
 Bc. Mrs. J. Leeman x Lc. Carmencita
 Bc. Digbyano-Trianae x Lc. Aulange
 Lc. Carmencita x Bc. Mrs. J. Leeman
 Lc. Britannia x C. gigas F. M. Byrodt
 Lc. Aulange x C. Adula var. vivid
 Lc. San Juan x C. gigas F. M. Byrodt
 Lc. Canhamiana x C. gigas F. M. Byrodt
 Broughtonia lilacina—Selfed
 Broughtonia sanguinea x Epidendrum ciliare
 Brassavola venosa x Broughtonia sanguinea
 Epidendrum fragrans—Selfed
 Epidendrum schomburgkii—Selfed
 Vanda coerulea x Vanda Sanderiana

The Orchid collection continues to develop in vigour under the cultural methods practised at Hope. The Orchid House in which the flowering plants are displayed with various other exotic plants, was maintained with a continuous show of blooms throughout the year and during the month of August the number of blooms in the house reached the record figure of four hundred and sixty-five. *Cattleya labiata* predominates during the summer months while at other times of the year the choice hybrid *Cattleyas* stand out for their extra qualities of beauty and form in the flowers.

Plant Houses.—The plant houses which are very old, have reached such a stage of decay in the main beams that it is now considered a waste of expenditure to carry out any further repairs.

The Fernery.—The interior of the Fernery House was remodelled. The mound of earth in the centre of the structure was removed and the floor level lowered so as to give the interior a sunken effect. The flooring is laid with some fine old stone slabs in the crazy pavement pattern. A Bird Bath stands in the centre. Two stone seats are built into two corners and a number of stone pedicels stand about the interior to hold specimen ferns.

Waterfall.—A waterfall was constructed at the entrance to the Water Garden. The flow of water entering the Water Garden at this spot was raised to a height of 9 ft. by means of a concrete structure. Large boulders were piled up on the side facing the Water Garden in such a way as to imitate a hillside. The water cascades over the large boulders and continues on its way to the many pools forming the water effect in the Gardens.

Sunken Garden.—Further progress was made in the work of excavating the site for the Sunken Garden. This work has been undertaken without any special vote of money being provided for the purpose and is being done by the Garden labour, consequently, the rate of progress is slow and the work can only be proceeded with as opportunity offers. It is hoped that by the end of 1933 the site will be excavated to the desired depth and the side banks planted with suitable subjects.

Retaining Walls to Parking Square.—A total of five hundred and fifty feet of stone wall, 1 ft. high, was constructed around the palm borders adjoining the Parking Square in place of the loose stone edging. A much neater appearance is maintained in this section of the Gardens since this work was completed.

Rose Garden.—The Rose Garden was very attractive at several periods of the year and hundreds of dozens of cut roses were sold to the public.

Bulb Garden.—A Bulb Garden has been laid out to the north of the Plant Nursery. The collection of hybrid Hippeastrums which have been somewhat hidden away from the public view in the past will be seen to better advantage in the new site when they bloom in the Spring of the year.

Entrance Gates.—The Gardens were fortunate in obtaining a pair of Iron Gates which were in use at the entrance to the Parade Court Yard up to the time of the demolition of the Court House. They have been removed by the Public Works Department to their Depot at Halfway Tree and we now await a favourable financial period to erect them at the main entrance to the Gardens.

Peafowls.—Two pairs of peafowls from the King's House Gardens were presented to the Department for these Gardens by His Excellency the Governor.

Collection of Cotyledons and Kalanchoes.—An interesting collection of Cotyledons and Kalanchoes was received from Reginald Cory, Esq., Duffryn, Cardiff, South Wales. The collection of plants is planted in one of the outside triangular corners of the Fern House.

Tea House.—Permission was granted to Mr. J. H. Rieche for the erection of a Tea House in the Gardens for the sale of refreshment to visitors. This has proved an asset to the Gardens and has been much appreciated. The Tea House is situated in the centre of the Mango Grove where visitors can sit under the shade of the Mango trees and enjoy their tea, etc.

Routine Work.—The routine work of the maintenance of the Gardens and the propagating and distributing of nursery stock was regularly attended to.

PLANTS DISTRIBUTED FROM HOPE GARDENS, 1932.

Sold.

Economic Plants—			
Coffee	..	..	13,391
Cacao	..	..	21
Citrus—Seedlings	..	..	48,582
Citrus—Budded Plants	..	..	1,078
Mango—Grafted Plants	..	..	848
Miscellaneous	..	..	7,723
			71,643
Ornamental Plants	..	..	21,629
			93,272

Free Grants.

Economic Plants—			
Coffee	..	..	2,500
Cacao	..	..	173
Citrus—Seedlings	..	..	4,158
Citrus—Budded Plants	..	..	44
Mango—Grafted Plants	..	..	17
Cane Tops and Cuttings	..	..	261,233
Elephant Grass Cuttings	..	..	9,500
Timber Trees	..	..	10,767
Miscellaneous	..	..	650
			289,042
Ornamental Plants	..	..	5,538
			294,580
Total Number of Economic Plants			360,685
Total Number of Ornamental Plants			27,167
Total Number of Plants Distributed			387,852

The following statement shows the distribution of plants for the last three years from the Nursery at Hope:—

	1932.	1931.	1930.
Coffee	15,891	28,044	39,660
Cacao	194	76	247
Citrus—Seedlings	52,740	31,584	65,494
Citrus—Budded Plants	1,122	1,010	1,633
Mango—Grafted Plants	865	1,322	1,729
Cane Tops and Cuttings	261,233	171,337	143,002
Elephant Grass Cuttings	9,500	9,800	17,600
Timber Trees	10,767	56,864	37,898
Miscellaneous Fruit and Economic Plants	8,373	6,643	3,113
Ornamental	27,167	33,183	31,288
	387,852	339,863	341,664

2. CASTLETON GARDENS.

Ornamental Shrubberies.—All the shrubberies had to be drastically pruned back to within a foot of the ground as a result of the indiscriminate cuttings of material for propagating plants for nursery stock during the past years.

Lawns.—The lawns and wooded landscape opened up by the river-side in 1931 has provided delightful accommodation for picnic parties that frequently visit Castleton Gardens from all parts of the island.

Potting Shed and Nursery.—The layout of the Nursery near the Main Road was re-arranged. The potting shed which had no artistic design in its structure was taken down and re-erected in a corner of the Nursery and well out of the public view. A shrubbery of ornamental plants has been planted on the site where the potting shed stood. When this shrubbery is fully grown there will be more privacy to the Nursery enclosure. Iron gates have been placed at the entrances to the Nursery.

The November Storm.—No damage of any importance was done to any of the rare botanical plants and trees during the high winds which blew while the hurricane passed to the south and west of the Island during November.

Lily Tank.—The Lily Tank started to leak very badly and the Public Works Department was requested to do the necessary repairs. The opportunity was taken at the time of repairs to renew the earth mounts in which the lilies are planted with fresh earth and manure. A young plant of the *Victoria regia* was planted in the centre mound.

Rose Garden.—The Rose Garden was an attractive feature at frequent periods of the year. The majority of the plants are of the pink and white Maman Cochet Rose.

Mangosteen.—Several of the Mangosteen trees (*Garcinia mangostana*) produced a good crop of fruits in September.

Routine Work.—The usual routine work of billing lawns, pruning shrubs, opening flood drains, forking and weeding borders and propagating plants for nursery sale was regularly attended to.

PLANTS DISTRIBUTED FROM CASTLETON GARDENS, 1932.

<i>Sold.</i>			
Economic Plants	..	..	335
Ornamental Plants	..	..	974
			1,309
<i>Transferred to Hope.</i>			
Economic Plants	..	..	1,057
Ornamental Plants	..	..	9,739
			10,796
Total Number of Economic Plants			1,392
Total Number of Ornamental Plants			10,713
			12,105
Total Number of Plants Distributed	..		12,105

3. PUBLIC GARDENS, KINGSTON.

Cannas.—The beds of Cannas in the Victoria Park were kept in an attractive condition by maintaining a regular show of bloom throughout the year. This is made possible by arranging the work of renewing the soil and replanting of fresh tubers in various sections in the Park at different times instead of overhauling all the Canna beds at one season.

Pathways.—The appearance of the Victoria Park continues to remain in a half-finished state of upkeep owing to the condition of the surfaces of the pathways through the Park. The Department is unable to undertake the work of re-surfacing and tarring the paths as it does not have the necessary equipment for doing this class of work.

Talipot Palm.—The Talipot Palm (*Corypha umbraculifera*) to the east of the Park flowered and seeded towards the end of the year.

Court House Site.—The site on which the Parade Court House stood is still in the hands of the Public Works Department and the Contractors. It would appear that it will be some time yet before the site can be taken over and laid out in conformity with the rest of the Victoria Park.

Routine Work.—The general routine of maintaining the Victoria Park, the lawns around the Public Buildings, the Memorial Square, the old Treasury Site and Headquarter House Gardens, was regularly attended to by the Garden Staff.

4. HILL GARDENS, CINCHONA.

The Maintenance Vote for these Gardens is very small, consequently certain sections become over-run with wild growth during the wet seasons. The Horticulturist, while on duty at Cinchona in August, was able to carry through a definite campaign against the advances of wild growth which was over-running the Fernery and Arboretum where there are some excellent specimens of *Alsophilas* and many rare specimens of the *Coniferae* family.

The usual demand for quantities of peat and moss, both for the Hope Gardens Nursery and the public was supplied from the Cinchona lands.

At the Xmas Season a large number of Pines and other suitable trees were supplied to meet the public, demand for Xmas Trees.

The Gardens were frequently visited both by people residing in the hills and those who go to the hills during the summer months.

5. KING'S HOUSE GARDENS.

Poinciana Avenue.—The *Poinciana* trees planted along the main drive to King's House have made satisfactory growth. Two of the young trees made their first showing of bloom during the summer.

No outstanding garden operations were undertaken during the year. The small orchid collection provided some nice blooms for display in King's House.

A plant of *Cassia grandis* was planted in the lawn to the south-west of King's House.

The pastures under the care of Mr. Harold Bolton and Mrs. J. A. Crooks were maintained in a satisfactory condition. The other pasture lands surrounding the Gardens were regularly cleaned by the Department.

The general routine work of mowing lawns, weeding borders and attending to floral decorations in the house was regularly attended to by the Garden Staff.

6. GORDON TOWN GARDEN.

The small garden at Gordon Town was maintained in a tidy condition out of the Hope Gardens Maintenance Vote.

7. BATH GARDEN AND NURSERY (ST. THOMAS).

Mr. R. Glen Campbell, Inspector of Plant Diseases, is in charge of this Garden.

During the year the St. Thomas Branches Associated asked that a large quantity of lime seedlings be supplied to their members and these seedlings are being grown at Bath Garden. A portion of the seedlings are now ready for distribution.

Several hundred Coffee seedlings were also grown for supplying orders in the surrounding districts.

Several unsightly beds in which the plants had become overgrown were remodelled and replanted.

There was a large number of visitors to the Gardens during the year.

The usual routine work was carried out and the Garden kept in a tidy condition.

8. SUMMARY OF PLANTS DISTRIBUTED BY THE DEPARTMENT DURING THE LAST THREE YEARS.

	1932.	1931.	1930.
Coffee	15,891	28,044	39,660
Cacao	419	78	247
Citrus—Seedlings ..	52,760	31,584	65,494
Citrus—Budded Plants ..	1,122	1,010	1,633
Mango—Grafted Plants ..	865	1,322	1,729
Cane Tops and Cuttings	261,233	171,337	143,002
Elephant Grass Cuttings	9,500	9,800	17,600
Timber Trees ..	10,767	56,864	37,898
Misc. Fruit and Economic Plants	8,463	6,734	3,872
Ornamental Plants ..	28,141	33,940	50,690
	<u>389,161</u>	<u>340,713</u>	<u>361,825</u>

9. The Garden and Plantation Sales for the last three years have been as follows:—

1932 ..	£613 1 9
1931 ..	699 11 1
1930 ..	761 19 9

10. The rainfall at the various Gardens for the year under review is as follows:—

1932.	Hope Gardens.	Castleton Gardens.	King's House Gardens.	Public Gardens, Kingston.	Hill Gardens, Cinchona.
January	0.80	7.41	0.65	0.32	4.54
February	0.47	2.42	0.17	0.13	1.19
March	0.62	2.82	0.41	0.35	0.70
April	7.54	12.32	5.72	2.45	12.43
May	6.49	19.10	3.97	3.80	5.79
June	2.52	7.75	1.51	2.90	2.65
July	2.77	7.71	1.73	1.10	0.95
August	7.92	9.44	4.87	3.30	4.73
September	4.33	8.91	4.01	0.64	6.66
October	9.85	20.17	6.29	5.52	11.91
November	6.32	27.22	4.57	3.07	22.25
December	0.52	16.98	0.15	0.00	5.04
	<u>50.15</u>	<u>142.25</u>	<u>34.05</u>	<u>23.58</u>	<u>78.84</u>

11. Contributions to the Gardens have been received from the following:—

Foreign.

Royal Botanic Gardens, Sibpur, near Calcutta.
 United Sugar Companies, Mexico.
 Missouri Botanical Garden, Balboa, Canal Zone.
 Royal Botanic Garden, Kew, Surrey, England.
 U. S. Department of Agriculture.
 U. F. Co., Tela, Honduras.
 Prof. Juan Balme, F.R.H.S., Mexico
 Reginald Cory, Duffryn, near Cardiff, South Wales.
 Messrs. Reasoner Bros., Royal Palm Nurseries, Oneco, Florida.
 F. H. A. Booth, Sydenhurst, Chiddingfold, Surrey, England.

Local.

W. Cradwick, Mandeville
 F. N. Isaacs, Immigration Office, Kingston.
 A. P. Hanson, Stony Hill.
 Wm. Bross Lloyd, Montego Bay.
 Lady Cuffe, Callendar, Kingsway.
 Manor House Hotel, Constant Spring.
 L. L. Carrington, Jamaica Agricultural Society, Kingston.
 Chas. Costa, Orange Valley, Brown's Town.
 J. B. Sutherland, Halfway Tree.
 G. P. Dewar, Harmony Hall, Duncans.
 E. M. Brown, Asst. Conservator of Forests, Kingston.

M. S. GOODMAN,
 Superintendent of Public Gardens.
 E. J. DOWNES,
 Horticulturist.

III.—AGRICULTURAL EXPERIMENTS.

EXPERIMENT STATION, HOPE.

Report of the Plant Breeder.

Canes.—The rainfall for the year under review was about the average for the past 51 years but during the first three months of the year only a deposit of 1.89 inches was recorded and this affected those plots that were planted during October and November the previous year.

During the year 261,233 tops and cuttings of the various varieties of sugar-cane were distributed, this being the largest number distributed in any year since 1924 and making a total of 4,157,506 tops and cuttings distributed free to both the estates and the small cane farmers for the past thirteen years.

The following is a list of the varieties and quantities of each distributed during the year under review:—

P.O.J. 2878	..	..	112,538
P.O.J. 2725	..	..	57,179
Uba	..	..	31,200
P. O. J. 2714	..	..	24,707
P.O.J. 2727	..	..	21,807
E.K. 28	..	..	4,804
S.C. 12/4	..	..	2,659
White Transparent	..	..	1,196
B.H. 10 (12)	..	..	1,012
B. 417	..	..	998
Mexican Striped	..	..	836
Co. 281	..	..	500
Co. 213	..	..	500
Ba. 11569	..	..	460
B. 891	..	..	400
B. 726	..	..	400
Badilla	..	..	25
H. 109	..	..	12

261,233

It will be noticed from the above list of plants distributed that the demand for the varieties which are highly resistant to Mosaic Disease has been much greater than for the less resistant but better commercial varieties.

During the year there was a continual demand for the P.O.J. 2878 and 112,538 cuttings were distributed or nearly one-half of the total number of cuttings distributed. The demand for cuttings of this variety was so large that very seldom could an order, except a small one, be supplied in full. This cane has given fairly good results on the whole when planted in light to clay loam soils with a good supply of water. One estate has just reaped this variety which has yielded over 106 tons per acre. This is the largest tonnage ever recorded in Jamaica for any variety of cane.

The P.O.J. 2878, unfortunately, does not stand up well to high winds and to give it a greater resistance to high winds it should be planted close, that is, 4 ft. to 4 ft. 6 inches between the rows and 2 ft. in the rows. A large number of cuttings of this and other P.O.J. varieties were distributed through the Agricultural Instructors to small cane farmers.

These varieties which are highly resistant to Mosaic Disease are a great help to small cultivators whom it is almost impossible to get to rogue their infected fields and also to estates where the infection is very severe in ratoon canes.

The P.O.J.s 2725, 2727, and 2714 are doing well under suitable conditions. The P.O.J. 2725 has reached, under irrigation, 90 tons per acre but its prolific arrowing has been a drawback in its proving a good ratooning cane, as in several instances where it was not possible to cut the plant canes until April, the ratoons arrowed profusely in November the same year and gave a very small and unremunerative yield.

The P.O.J. 2714 is increasing in popularity among the planters and in the areas where the rainfall is low the purity of the juice is fairly good.

The P.O.J. 2727 has in several instances given good yields in both plant canes and ratoons.

The B.H. 10(12), the standard cane which is susceptible to Mosaic Disease, is being gradually replaced by the Java canes in districts where ratoons are heavily infected with Mosaic Disease.

S.C. 12/4, owing to its being very susceptible to Mosaic Disease and failure to ratoon on some estates is not considered worthy of being more extensively cultivated.

The B. 726 and B. 891, two Barbados varieties, when transferred from quarantine in 1930 to the Experiment Station developed Mosaic Disease so rapidly that in a couple of months every stool was diseased. Another site in the Experiment Station was selected and plots of the above varieties were replanted and this time only two cases of disease were noticed. The B.726 which, in the Experiment Station, has shown better promise than B.891, has been planted in a large plot and from this we hope to distribute a large number of cuttings in the fall of 1933.

Several plots of old canes in the Station were discarded, ploughed out and replanted with those varieties that are in greater demand.

Cover Crops.—When Mr. F. A. Stockdale, Agricultural Adviser to the Colonial Office, visited Jamaica early in the year the opportunity was taken of discussing with him the advisability of growing cover crops through banana both as a means of reducing the cost of weeding and improving the condition of the soil. Mr. Stockdale promised that he would have seed of Green Manure and Cover Crops forwarded to us and during the year the following were received from the Department of Agriculture, Ceylon:—

Centrosema pubescens
Crotalaria anagyroides
Tephrosia candida
Crotalaria usaramoensis
Tephrosia vogelii
Indigofera endecaphylla

These were sown between the rows in the old banana plot but owing to heavy rains which fell for days and flooded the field, the germination was very poor. The *Indigofera endecaphylla* did not germinate. Of the few plants that grew, seeds will be collected and another effort made to establish them under the shade of the banana. *Crotalaria usaramoensis* grew better than any of the others under the shade.

Seed of *Alysicarpus rugosus* and Soya Bean (*Glycine Max*) were received from Kew. These were also planted under the shade of the banana. The *Alysicarpus* has been twice replanted but will not thrive under shade. The Soya Bean is much more promising than the former and repeated sowing of seed will be made.

Bananas.—The section which was used for experiments in oil treatment for killing bananas was replanted in 1931. The plants came into bearing during the year and produced a good crop. The older section containing first and second ratoons gave quite a good crop. Trapping for borers was continued and has proved to be a very effective practical method of keeping this pest under control.

Citrus.—All the trees in the old grove were circled around and mulched during the year. A few of the old trees showed signs of gumming and were immediately treated. Pruning and spraying with Lime Sulphur Wash was done during the early part of the year but was discontinued during the latter part to give the Entomologist an opportunity of testing out the 'Eddie' Wasp (*Eretmocerus serius*, Silv.) as a natural enemy against the Black Fly.

Coffee.—The usual cultivation was given and all the young trees that died were supplied. A fair crop was reaped after which all the trees were pruned. The harvesting and curing of the berries were done by the Students.

Cacao.—The crop was below the average this year due to poor bearing and destruction of the pods by rats. The usual pruning was done. All leaves and pods were carefully buried between the rows.

Tobacco.—A small plot of Virginia was grown from seed supplied by the Jamaica Agricultural Society. Very good returns were obtained and the Students had the opportunity of getting practical experience in its cultivation, harvesting and curing.

Cassava.—A varietal test was continued this year and the results were very promising with the following varieties:—

Bitter: Malta Hotel, Hanover, Spanish Town, White Stick, Blue Bud, Bunch of Keys, Cotton Tree.
 Sweet: George Blade, Yellow Belly.

Ground Nuts.—A plot of $\frac{1}{2}$ sq. ch. was divided in two to determine the best distance for planting. One quarter square chain was planted 3 ft. between the rows and 9 ins. apart in the rows and one-quarter square chain 3 ft. by $1\frac{1}{2}$ ft. in the rows. The former distance yielded $2\frac{1}{2}$ bushels while the latter yielded only $1\frac{1}{2}$ bushels. The results from this experiment are in favour of the closer method of planting.

Agricultural.—The Farm School Students as in previous years continued to visit the Experiment Station for five days each week. They carried out experiments in the School Garden with various vegetable crops and received instruction in nursery work as well as in the various methods of cultivation of the different crops.

M. S. GOODMAN,
 Plant Breeder.

IRRIGATION EXPERIMENTS IN THE PEDRO PLAINS.

The Irrigation Experiments started in 1930 in the very dry area of the Pedro Plains in St. Elizabeth on lands of Mr. Brodie, Williamsfield, were discontinued at the end of March this year owing to the depression and also to the unsuitability of this district to banana growing on account of the very high winds which prevail in these plains throughout the year.

The growing of vegetables was successful and it has been proved that vegetables of a very good quality could be grown under irrigation in these plains and the yields were also considered good.

The Budded Grapefruit, Grapefruit Seedlings and Grafted Mango plants set out in 1930 have grown well and should soon be producing fruits.

The Montgomery Red Poll Bull which was under the care of Mr. Bennett, Mountainside, for the use of the small settlers of the district to improve the breed of their stock has, at the death of Mr. Bennett, been taken over by Mr. Brodie, Williamsfield.

M. S. GOODMAN,
Acting Superintendent of Agriculture.

IV.—DISEASES OF ANIMALS.

The Government Veterinary Surgeon acted as Director of Agriculture from 22nd June, 1932, when Mr. Cousins left the Island, until the end of the year. Dr. V. Tavares was appointed to act as a part-time temporary officer, from 1st October, 1932 to the end of the year.

There were no serious outbreaks of contagious or infectious diseases among animals during the year. The usual courses of lectures and demonstrations were given to the Students at the Government Farm School.

The cattle at the Government Stock Farm, Hope, were attended regularly. The annual tuberculin test (intradermal method) was carried out 6th to 10th June, 1932. All cattle, except young calves, were subjected to the test which resulted in no reactors.

The Government Veterinary Surgeon being on leave of absence on account of ill-health, a full report on the veterinary work during 1932 is not available.

F. E. V. S.
June, 1933.

V.—PLANT DISEASES AND PESTS.

Report of the Secretary of the Advisory Committee on the Banana Industry.

The membership at the beginning of 1932 was:—H. H. Cousins, Esq., M.A., Director of Agriculture (Chairman); Hon. J. H. McPhail, Hon. T. J. Cawley, Hon. K. V. Abendana, Messrs. P. Lindo, F. A. Cory, J. R. Johnson, G. J. Goble, L. L. Carrington (Secretary Jamaica Agricultural Society); F. E. V. Smith, (Government Microbiologist). Mr. Graham Hawkins was appointed to the Committee in July, 1932. Mr. J. Roy Johnson resigned in favour of Mr. M. O. V. Ffrench-Mullen and Mr. Carrington resigned in favour of Mr. G. Baxter. These gentlemen were appointed to the Committee by the Governor. Dr. Lockett acted as Chairman from the time Mr. Cousins retired from his office.

The Supervising Inspector of Plant Diseases attended all the meetings.

2. Three regular meetings were held during the year. The routine business was dealt with by means of circulated papers, 60 of which were issued during the year.

3. The Committee considered the subject of the treatment of Panama Disease on several occasions and recommended that the present system should be maintained at all costs and that those offending against the Regulations should be prosecuted.

4. At a meeting held in August the subject of the Banana Borer was thoroughly discussed with the Government Entomologist. As a result of this a Resolution was passed asking the Director of Agriculture to seek information from Dr. Myers of the Imperial Entomological Institute as to the possibilities of obtaining a suitable parasite for the Banana Borer *Cosmopolites sordidus*.

5. The Committee held a special meeting to consider the recommendations made by the Microbiologist in Microbiological Bulletin No. 1 of 1932. As a result of this meeting the Committee recommended to the Government that the proposals of the Microbiologist should be accepted and the necessary funds provided for a thorough investigation into the commercial qualities and possibilities of the bananas which had been raised through the efforts of the Supervising Inspector of Plant Diseases; that a Cold Storage Plant should be erected for this investigation and the investigation of problems arising in connection with the cold storage and transport of bananas, citrus and other vegetable products of the Island. Recommendation was also made for the establishment of large nurseries for the purpose of re-establishing land abandoned on account of Panama Disease in remunerative crops.

6. As an outcome of this meeting an interview was granted by His Excellency the Governor and finally the necessary financial support was promised by Government and this has been granted by the Legislative Council in 1933.

7. The Summary of the Incidence of Panama Disease for the year 1932 is appended.

F. E. V. SMITH,
Government Microbiologist and
Secretary to the Committee.

Summary of Incidence of Panama Disease in Parishes other than Portland in 1932.

Parish.	Diseased Plants.	New Cases.	Recurrences.	Total Cases.
St. Mary ..	64,506	1,008	37,457	38,465
St. Thomas ..	7,991	745	4,563	5,308
St. Ann ..	5,364	201	2,155	2,356
Trelawny ..	954	13	224	237
St. James ..	16,598	222	4,945	5,167
St. Catherine ..	14,683	737	9,102	9,839
Hanover ..	490	43	227	270
Clarendon ..	7,758	261	2,127	2,488
Manchester ..	531	38	191	229
Westmoreland ..	1,263	23	753	776
St. Elizabeth ..	109	6	6	12
St. Andrew ..	1,475	74	274	348
Total 1932	121,722	3,371	62,124	65,495
Total 1931 ..	96,213	3,102	52,435	55,537
Total 1930 ..	73,315	2,670	39,471	42,141
Total 1928 ..	36,661	2,417	18,224	20,641
Total 1929 ..	17,005	1,776	7,987	9,763
Total 1927 ..	11,088	1,193	4,822	6,016
Total 1912 to 1932 (excluding Portland)	370,996	16,485	189,622	206,107

Monthly Totals.				
	Diseased Plants.	New Cases.	Recurrences.	Total Cases.
January ..	8,973	298	5,198	5,496
February ..	10,387	344	4,979	5,323
March ..	12,099	288	6,156	6,444
April ...	9,679	281	4,432	4,713
May ..	10,307	146	6,216	5,362
June ..	10,290	268	5,038	5,306
July ..	9,267	300	5,477	5,777
August ..	10,572	278	5,212	5,490
September ..	10,198	242	5,204	5,446
October ..	9,506	360	4,418	4,778
November ..	9,680	353	4,779	5,132
December ..	10,764	213	5,015	5,228

F. E. V. SMITH,
Microbiologist and Secretary to
the Advisory Committee.

PLANT DISEASES IN JAMAICA IN 1932.

Report of the Government Microbiologist.

During the year under review the work in this division has been directed to several investigations. Apart from the normal routine advisory work and that connected with Panama Disease control, investigations concerning the killing of banana plants with "Approved Oil" have been continued, a special investigation has been made into the outbreak of disease in Coconuts on the northside of the Island while a considerable portion of time during the latter months of the year was taken up in the preliminary arrangements for the Banana-Citrus Cold Storage Scheme which is mentioned in another portion of this Report.

The Microbiologist acted as Government Entomologist in addition to his substantive duties for three months during the leave of absence granted to Mr. W. H. Edwards.

A number of points which would normally appear in this section of the report have been included in "General Observations" page 1.

GENERAL.

The rainfall of the Island during 1932 was more normal than in the previous year although in many parishes the precipitation was not evenly distributed during the whole year. The result of this smaller rainfall was shown in a marked decrease in the storage rots of citrus such as Stem End Rot and Blue Mold.

The interest of planters in the health of their crops has again shown a marked increase resulting in a continued increase in the demands for advice in connection with plant diseases. The interest which planters are now taking in the activities of the Technical Officers of the Department is very noticeable and has resulted in greater demands on the time of these officers for advisory work both at the Laboratory and in the field. The steadily increasing general interest in the secondary crops and their bye-products constantly brings new problems and difficulties into prominence, resulting in the seeking of advice on a diversity of subjects. It

is particularly interesting to notice the increase in problems which come forward connected with the agricultural product itself as compared with its production. Whereas a few years ago this branch of the Department's activities was connected primarily with plant disease during growth, enquiries now come in constantly in connection with problems of losses in fruit of all sorts during transport, the preservation of fruit bye-products and numerous other problems connected with the "finished article." This is a healthy sign and shows that the Jamaica planter is making a real effort to put his products on the market in the best possible condition, and so obtain the maximum return for his expenditure in the field. The direct effect of this attitude is an increasing confidence in Jamaica products resulting in more stable markets.

BANANAS.

Panama Disease (Fusarium Cubense, E. F. Sm.)—In spite of the heavy rainfall of the previous year the percentage increase in the incidence of Panama Disease was noticeably smaller than in recent years, it being 26% as compared with 31% of the previous year and over 100% both in 1930 and 1929. This decrease was equally marked in all the parishes with the exception of St. Andrew where a serious outbreak occurred in the irrigated lands.

The parishes showing the greatest relative increase were St. Catherine, Clarendon and St. James. In all these parishes a great deal of infection was carried by water and the greater portion of new cases can be attributed to the inundation of banana lands by the swollen rivers during the rainy season. It is noticeable that there has been a distinct reduction of the incidence of the disease since the use of "Approved Oils" for killing bananas in the treatment of disease. Whether this is more than a coincidence it is yet too early to state with finality.

Several alleged or suggested cures for Panama Disease have been tested at the Government Laboratory in the infected plot which is maintained at this institution for the purpose of making tests of all description. An imported "cure" for the disease which was distributed to some planters was put to test and found valueless. The constituents were found to be worth less than a $\frac{1}{2}$ d. per gallon.

A very full review of the Panama Disease situation in relation to the future of the Jamaica banana industry was given in Microbiological Bulletin No. 1 of 1932, published during the year. In this report it was shown that the loss of land up to the end of 1931 represented approximately 15,660 acres. The additional losses in 1932 amounted to 1,700 acres and it is anticipated that by the year 1940 the effects of Panama Disease on the exports will become very noticeable. The effects of the anticipated early loss of much of the best riverside and valley lands will also have an appreciable effect upon the general average quality of the fruit produced. It is hoped, however, that the activities of the Department in breeding new immune kinds of bananas will result in a variety of the necessary commercial qualification before the inroads of the disease have reached the stage of causing any alarming reduction in the exports.

The report in question included proposed schemes for the development of large Government citrus nurseries and the further investigation of the immune banana in regard to their commercial exploitation and behaviour in cold storage. This scheme, since known as the "Citrus-Banana-Cold Storage Scheme" was accepted by Government and has since received the approval of the Legislature resulting in a vote of nearly £6,000 for the first year's working.

The minor diseases of bananas, Bonnygate Disease (*Sphaerostilbe Musarum*, Ashby), Black Spot (*Cercospora Musarum*, Ashby), Marasmius Disease and Water Soak occurred from time to time in certain districts.

SUGAR CANE.

Mosaic Disease continued to appear on estates but not generally in very noticeable quantities. The introduction of the P.O.J. varieties and their distribution to planters has had a marked effect upon the incidence of this disease.

Root Disease.—This disease has occurred on many estates especially where cultivation and drainage had been neglected.

There were no outstanding cases of disease in this crop during the year.

COCONUTS.

The only outstanding case of fungus disease in coconuts was an outbreak of Bud-Rot in the western end of the Island as an immediate result of the storm. Timely action by the Plant Disease Inspectorate in destroying diseased trees and advising planters as to the treatment of those trees which have suffered damage from wind saved the extensive damage from this disease which is the usual aftermath of a hurricane.

The leaf trouble which was mentioned in previous reports became very apparent in St. Mary and the adjoining districts during the early part of the year and resulted in great alarm among the planters of this area. The trees developed more intense symptoms of the trouble, in many instances as many as 50% of the leaves upon a single tree being affected.

Generally speaking, the symptoms developed consisted of the "browning" of the pinnae throughout a well defined portion of each leaf—frequently in the middle. In some instances, instead of a brown discoloration the affected leaflets turned an ashen grey. In both forms of the trouble, gummosis of the petiole in the region of the discoloration was also apparent. In spite of careful investigation, no pathogenic organisms were found in association with the disease and it was quite clear that this widespread trouble was really the final response of the trees to the accumulated physiological disturbances resulting from some 4 or 5 years of peculiarly abnormal weather conditions. The symptoms were most noticeable on trees about 20 to 30 years of age which had been planted on second class lands. A popular account of the disease was published in the Journal of the Jamaica Agricultural Society and it is proposed to publish a more detailed account elsewhere. While the disease obviously has some "generic" relationship with the "Bronze Wilt" disease of Trinidad, it is quite clear that it is distinct from that trouble in that no deaths have been reported and with the return to more normal weather conditions the trouble is showing rapid recovery except in those areas where the trees are growing under adverse conditions of soil, cultivation and drainage.

CITRUS.

The demands for advice on citrus diseases of all kinds has continued to increase by leaps and bounds. The usual gumming and other bark diseases have been apparent in the old trees, while there has been a considerable amount of die-back in young grapefruit trees, especially where soil conditions are unfavourable.

With a more moderate rainfall during the reaping season, there was a noticeable decrease in the incidence of storage rots. It is pleasing to record that the system of debutting after treatment with ethylene devised as a result of the extensive experiments carried out in the previous season, has proved to be a complete commercial success where it has been applied in the manner recommended. In large scale commercial experiments involving many thousands of fruit it was found possible to reduce the losses from stem end rot (chiefly *Diplodia natalensis* and *Plasmopsis citri*) from 31% to 1% when the system was properly applied and at a cost of a little over 1d. per box. The full report on these experiments has appeared in the *Journal of the Jamaica Agricultural Society*.

COFFEE.

Damping off (*Rhizoctonia solani*, *B. and G.*) occurred again in some of the nurseries but was well controlled by the use of Cheshunt mixture. It is interesting to note that this mixture has been used with excellent effect for a number of crops in which the seedlings are liable to suffer from Damping off. It is also being used with considerable success for root diseases and Collar Rot of many plants cultivated in gardens. The American Leaf Disease (*Omphalia flvida*) occurred occasionally in the Port Royal Mountains. These were not, however of any importance. Occasional cases of Black Rot (*Rosellinia spp.*) continues to occur in all parts of the Island. In some cases the losses have been considerable especially in the mixed cultivation of small settlers where the fungus finds an abundance of suitable material to maintain its development and in consequence spreads quite readily from plant to plant throughout parts of these holdings.

MAIZE.

Occasional cases of Smut (*Ustilago Maydis*) and Rust (*Puccinia sorghi*) were reported.

TOBACCO.

The damage from Mosaic in the ratoon crops was again very noticeable. Tobacco cultivation, however, is practised almost entirely by small cultivators in scattered areas over the southern side of the Island. It is therefore difficult to impress upon these growers the necessity for roguing their crops and eliminating this disease.

PINEAPPLE.

The disease which affects the base of the plants, causing an evil smelling rot, was again very noticeable. A Phycomycete apparently *Phytophthora parasitica* was usually present in the specimens examined. The diseases of pineapples were studied by Dr. Carter of the Hawaiian Cannery Association, during a visit which he paid to the Island in the Summer

GRAPES.

Anthraxnose (*Gloeosporium amphelophagum*) occurred in many places. Downy Mildew (*Plasmopara viticola*) was particularly abundant in the parish of St. Elizabeth.

PAW PAW.

It has not been possible, through the pressure of other work and the lack of facilities, to continue any close investigation into the Mosaic disease which has caused considerable damage in recent years. It is hoped that with the appointment of a Geneticist that an investigation into the possibilities of securing a variety immune to this disease will be taken in hand at some future date. The control of the disease by means of an immune variety would appear to be the only feasible solution to this problem.

VEGETABLES.

Irish Potato.—Late Blight (*Phytophthora infestans*) and Early Blight (*Macrosporium solani*) were recorded on several occasions but neither of these diseases caused any serious losses during the year under review. Common Scab (*Actinomyces scabies*) was fairly common at certain seasons of the year especially on light soils and more especially on the "red dirt" soils of Manchester.

Tomato.—Lead Mould (*Cladosporium fulvum*) and Late Blight (*Phytophthora infestans*) were noticeably more common than usual. Preliminary spraying experiments with "Shirlan" and "Agral" indicate that there are possibilities of controlling Leaf Mould disease with this fungicide. Further trials will be made during the coming season.

A noticeable feature in connection with Leaf Mould disease is the more severe damage which appears to be caused by this fungus on the American varieties as compared with the European varieties. A similar state of affairs appears to exist in regard to Mosaic Disease. It was frequently observed that where American varieties were grown either side by side or interplanted with English varieties the English varieties produced a crop of good fruit while the American varieties were completely distorted by Mosaic disease often before they reached the stage of bearing fruit.

The activities of certain individuals, especially on the Liguanea Plain during the past year, in connection with vegetable growing has brought to light many troubles which may be anticipated in Jamaica in growing vegetables on a commercial scale for export. Several diseases of Peppers, Tomatoes and other vegetables

which had not previously appeared to be of any consequence under ordinary conditions of garden cultivation have caused considerable damage and loss under field conditions. If the growing of vegetables on a commercial scale is to be developed it will be necessary for innumerable investigations to be initiated into methods of controlling these diseases. In many cases, however, climatic conditions would appear to militate against the ready control of these diseases.

RAISING ORCHIDS FROM SEEDS.

This research has been continued during the year but a little less actively than during the previous year, there being more demands for other work. The seedlings that have been raised have been passed over to the Horticulturist who is now growing these in pots in a specially constructed house in Hope Gardens. It is anticipated that within a few years the Department will be in possession of a very large stock of hybrid orchids as a result of this work, and, as many of these orchids have been raised from crosses between species and varieties of acknowledged merit, it is anticipated that the value of this collection of new varieties will be very considerable.

INSPECTIONS.

The routine inspection of all seed potatoes and certain plants entering the Island has been carried out as usual. Certificates of Health for plants being exported have also been issued when necessary.

PUBLICATIONS, ETC.

Several articles have been published in the Journal of the Jamaica Agricultural Society on Diseases of Plants. A Bulletin on the present status of Panama Disease in the Island of Jamaica has also been published. Further additions have been made to the Plant Disease Museum and this has continued to be a source of interest at the Government Laboratory.

F. E. V. SMITH, B.Sc.,
Government Microbiologist.
June, 1933.

Report of the Government Entomologist.

I have the honour to submit hereunder my Report for the period extending from January, 1932, to the end of September, 1932, when I left the Island on vacation leave to resume my duties in February, 1933. When I left the Island the Microbiologist was appointed to act as Entomologist.

The more important pests and matters dealt with during the nine months under review have been:

BANANA.

The situation with regards to the Banana Borer, *Cosmopolites sordidus* germ. improves slowly but steadily as the value of field sanitation becomes more and more realised by planters. In this connection the part played by some of the Agricultural Instructors in diffusing amongst the small planters the necessary information as regards destruction of breeding places and trapping of the adult, begins to bear fruit.

In St. Mary several small holdings were visited in company of the Agricultural Instructor for the district with a view of investigating the situation in a region where the pest had been in the past a serious menace to the Banana Industry. It was found that through the adoption of sound agricultural practices the borer there is now a negligible factor as regards production.

On account however of the broken nature of the land which in very many instances prevents the adopting of cultural methods that help to keep the pest under control and on account of extreme division of properties amongst small proprietors who often cultivate bananas as a casual source of revenue, and therefore do nothing to control the borer on their properties, it remains highly desirable to establish in Jamaica some measure of biological control against the pest. The question is receiving the attention of the Entomologist who is indebted to experts of the Imperial Institute of Entomology for their co-operation in the matter.

As a result of information conveyed by the Secretary of the Jamaica Agricultural Society that a mixture of coal tar and kerosene smeared on banana suckers had been used with complete success by planters in St. Mary to deter *Cosmopolites sordidus* from attacking newly planted suckers, two series of experiments were carried out to test the efficacy of the method.

The results obtained have shown that if the treatment is applied heavily enough to deter borers from entering the more vulnerable parts of the corms the plants are seriously injured by the treatment.

The results of series of other experiments with insecticides have been communicated to the members of the Advisory Committee on the Banana Industry and discussed at one of the meetings of the Committee.

SUGAR CANE.

During the period under review no very serious outbreak of insect pests affected that crop.

Ratoons as well as newly planted cane cuttings were however sometimes attacked by the termite *Euterpes rippertii*, Ramb. The infestation of sugar cane fields by that pest can as a rule be traced to the presence of decaying stumps of coconut or other trees which harbour large colonies of the termites.

CITRUS.

The Introduction of a Parasite of the Citrus Black Fly, Aleurocanthus Woglumi.

A consignment consisting of Adults of *Eretmocerus serius*, Silv. and of nymphs of the Black Fly, *Aleurocanthus woglumi*, Ashby, parasitised by that wasp was received in May from Cuba where they had been introduced from the Malay peninsula.

The Black Fly, since it was first recorded in Jamaica twenty years ago, had spread all over the Island and gradually become one of the most serious pests of Citrus, Coffee and many other economic plants. As its control by chemical agencies is practically impossible on account of the abundance and diversity of its host plants, the introduction of a natural enemy of the Black fly will prove of very great economic significance.

The parasites bred under quarantine conditions at Hope, were liberated in three localities presenting different climatic and other environmental conditions. By the end of September the parasites had become so successfully established in two of these localities that distribution to owners of groves situated in different parts of the Island was started.

By September the wasp had become so well established at Hope and Silver Hill that it became possible to liberate hundreds of adults in the citrus nurseries at Hope and at Caymanas as well as on trees in Castleton Gardens. By the infestation of nursery plants it is expected that the dissemination of the parasite over the whole Island will be hastened.

I am indebted to the Imperial Institute of Entomology for the attention given to this matter and in particular to Dr. G. J. Myers for having obtained from Cuba and sent to us in excellent condition the material from which these beneficial insects were obtained. It is not premature to say these have now been successfully established in Jamaica.

Coccus Viridis.—The Green Scale (*Coccus viridis*) continues to be one of the most important pests of citrus. Plants from two to five years old especially and older trees on which *Cremastogaster* ants have their fornicaries have been particularly damaged.

Such ants and especially the Dougal Campbell Ant, *Cremastogaster brevispinosa*, var. *minor* have in the past and are still often purposely bred on the trees and introduced in new groves by planters who desire to control the Black Fly *Aleurocanthus woglumi* by these natural enemies of the Aleurodid. Every opportunity is now taken to discourage a practice which though in a certain measure helps to control the Black Fly causes the dissemination of another equally destructive pest, the Green Scale.

The fact that the presence of the Black Fly and of the sooty moulds, which grow abundantly on their excretions, is much more noticeable than the presence of the Green Scale, has rendered the task of convincing the planters not to breed ants in their groves more difficult. The introduction of the Eulopid wasp which parasitises the Black Fly will indirectly but greatly help in the campaign against the Green Scale by rendering the breeding of the above-mentioned ants unnecessary.

The Florida Red Scale, (*Chrysomphalus ficus*, Ashm.) and the Purple Scale, (*Lepidosaphes beckii*, Newm.) were not as injurious as usual, this being a result of the regular spraying with insecticides and better cultivation now practised in many citrus groves.

Slugs and snails were as usual abundant in those localities where thick layers of rotting leaves are used as mulch and also where numerous stone walls are built across the fields. Excellent results were obtained for their control by the use of traps made of cut portions of banana stems. Grease bands placed under the cover of inverted funnels formed by tying a circular piece of tin around the trunk of trees also prevented these pests from attacking the foliage of trees in infested groves.

COCONUT.

During the year *Aspidiotus palmarum*, Morg. and Ckll. was very much in evidence on trees which had suffered from the adverse meteorological conditions mentioned in the Microbiologist's Report. The lady-bird beetle, *Exochomus ritchiei*, Sic. was found to control the outbreaks of that pest in a remarkable manner.

The Shot Hole Borer, *Xyloborus perforans*, was reported from an Estate in Trelawny.

TRUCK CROPS.

Owing to renewed interest in the cultivation of truck crops for exportation, large number of insect specimens and plants were received for examination and advice.

The insects observed in the fields or which were submitted by planters have been:—

Affecting—Tomato } *Heliothis obsoleta*, F.

and }
Egg Plant } *Loxa flavicollis*, Dru.

Sweet Potato: *Corecoris fuscus*, Thumb.

Cucumber: During the summer the Melon Aphis (*Aphis gossypii*, Glov.) was very prevalent in the Liguanea Plains, affecting chiefly cucumber growing luxuriantly on irrigated lands. An inexpensive remedy has been spraying with tobacco decoction prepared with tobacco refuse so easily procurable locally, but the difficulty has been in getting the growers to spray as soon as outbreaks started.

The caterpillars of *Diaphania hyalinata*, L. occasionally caused serious defoliation.

Cabbage: *Pontia monuste*, L.

Plutella cruciferarum.

Beet and Lettuce were severely attacked by the Flea Beetle, *Disomyza laevigata*, Jac. Complete control of that insect was rendered difficult in the Liguanea Plains, owing to the fact that one of its host plants *Alternanthera ficoidea* (Amarantaceae) is a common weed there.

Eel Worms.—Samples of roots of Lettuce, Tomato, Cucumbers, Celery, Beans and Mulberry trees were found heavily infested by the Eelworm (*Heterodera radicola*). The effect that these nematodes have had on the last mentioned plant may prove a limiting factor to the development of the silk industry in districts where the nature of the soil is favourable to the development of the pest. In St. Andrew as well as in certain parts of Manchester, failures to establish mulberry trees on light dry soils have been traced to heavy attacks of *Heterodera*.

Millepedes.—Lettuce and several other tender newly set vegetable plants have frequently been severely attacked and destroyed by garden millepedes. Outbreaks of these destructive myriapods can be ascribed to the constant humidity of the soil caused by uninterrupted irrigation as generally practised in the truck crop gardens of the Liguanea Plains and also to the decaying vegetable matters used as mulch or left in heaps alongside vegetable beds.

Crickets.—The Brown Cricket, *Gryllus assimilis*, F. has been troublesome in flower and vegetable gardens as well as in fields and in citrus nurseries where fumigation of the soil with calcium cyanide controlled the pest.

Cutworms.—Seedlings as well as newly set plants were attacked by cutworms, *Prodenia ornithogalli*, Guen. *Lycophotia infecta*, Ochs. and *Xylomiges sunia* Guen. Control with poison baits and adequate sprayings reduced the losses caused by these widespread and common pests.

PAPAYA.

Mosaic of Papaya having been prevalent in St. Andrew, the possibilities of an insect vector has retained my attention. It has so far only been possible to make but few observations, but they seem to indicate that the Aphids and Aleurodid which frequently infest those plants do not seem to transmit the disease.

In some cases when the lower branches of trees whose main stems were dying with the disease were left standing, whilst the diseased main stem was removed, those side branches have developed into healthy stems which have borne fruits though those branches had been infested with aphids simultaneously with the diseased main stems.

EXAMINATION OF PLANTS.

Inspection of plants and of potato tubers were made in connection with their importations and exportations from the Colony.

CONTRIBUTIONS TO THE JOURNAL OF THE AGRICULTURAL SOCIETY.

Articles on entomological problems were contributed to the Journal of the Jamaica Agricultural Society.

LECTURES.

On various occasions practical demonstrations on the application of insecticides were made and lectures on entomological subjects were delivered to planters and to Agricultural Instructors.

INSECT COLLECTIONS.

Additions were made to the Department's insect collections. I am indebted to the Imperial Institute of Entomology for identification of specimens submitted.

With a view of arousing the interest of the public in entomological problems and that of school children in Natural History in general, the Insect Collection and the Arthropods in the exhibits of the Museum of the Institute of Jamaica, are being gradually classified and labelled.

DEPARTMENTAL PUBLICATIONS.

An Entomological Bulletin No. 6 "Importation into Jamaica of a Parasite (*Eretmocerus serius*, Silv.) of the Citrus Black Fly (*Aleurocanthus Woglumi*, Ash.) Entomological Circular No. 13, 'Directions for sending Insect Specimens for Identification and for making Entomological Enquiries' were published during the period under review.

W. H. EDWARDS, D.I.C., F.E.S.,
Government Entomologist.

VI.—PLANT BREEDING.

Report of the Geneticist for 1932.

I have the honour to submit my Report for 1932.

(2) I arrived in the Island and assumed my duties as Geneticist on November 25th. Previous to my arrival I had made a stay of six weeks in Trinidad at the Imperial College of Tropical Agriculture where the extensive collection of Banana varieties was examined and the possibilities of producing commercial seedling varieties immune to Panama Disease with various parental combinations was investigated.

(3) During the period of one month under review the work done was of a purely preliminary nature involving in part the drawing up of plans for the furnishing and equipment of my laboratory.

(4) A tour through the Island of three days duration was made in company with the Microbiologist, several estates were visited and the conditions under which bananas and other major crops of Jamaica are cultivated, were studied.

(5) *Banana breeding*.—Owing to the high winds of November 9th, the breeding plots at Castleton suffered severe damage and when I arrived here breeding work had been brought to a standstill. This opportunity was therefore taken of making a thorough examination of the results of previous banana breeding in the Island and pending a cytological examination of the seedling varieties a preliminary breeding programme was drawn up and will be put into operation early in 1933. Six seed-producing types of *Musa* were brought from Trinidad for use as male parents for crossing with the Jamaica banana and are now growing at Hope. Meanwhile it is proposed to continue the production of seedlings from the Jamaica-Robusta cross. The numerous seedlings which have been bred in the past at Castleton have been examined, and among those which have proved to be immune to Panama Disease several show distinct promise as possible commercial varieties. Mr. Sutherland is to be commended on the results he has obtained and on the organisation of his breeding programme.

I wish to record my indebtedness to the members of the staff for their excellent co-operation in assisting me with the commencement of my duties in the Department.

(Sgd.) L. N. H. LARTER,
Geneticist.
7.2.33.

Report of Supervising Inspector of Plant Diseases on Banana Breeding.

The work on breeding new varieties of bananas was carried out at the three stations, Castleton, Caymanas and Hope. The number of seeds obtained has been less than in the year 1931. Only seven seedlings were reared. Nine plants were discarded owing to a peculiar type of chlorotic condition in the leaves which prevented them from growing vigorously.

During the year the upper plot at Castleton was badly affected with Panama Disease and treatment according to Law had to be carried out so materially reducing our seed production. In May and June last year owing to exceptional rainfall over a period of three weeks, the seedlings both at Caymanas and at the District Prison became water-logged as both sites could not be thoroughly drained. This produced a marked set-back.

In order that the maximum number of suckers might be produced, pruning operations were stopped early in the year and as a result it was impossible to judge of the commercial qualities of the fruit produced. An experiment was tried by cutting back some trees to see if more suckers would be developed, but this proved not to be the case. Manures were used by the Agricultural Chemist but no difference with the control plots was observed.

There are now over 50 varieties of banana plants produced by the cross pollination carried out by me during the past 4 years and the total number of different seedlings reared now stands at 126. The Highgate, mutant of the Gros Michel which is a hurricane-resisting banana, has been increased by rapid propagation from twenty suckers to three hundred. I have planted out 200 suckers of this variety at Castleton and every attempt will be made to produce seeds therefrom. One seed has already been obtained by crossing this variety with seedling 17 as male parent.

Three planters have already sold bunches of the seedling bananas to the trade for marketing. Three thousand suckers of seedlings have been planted out on ten acres of land in two different parishes. Some five hundred plants are being tested in different parts of the Island. Up to the present Panama Disease has not yet affected any of the more promising seedlings, although they have been planted on highly infected land where the Gros Michel succumbs to disease in 6 months.

The following is a description of the varieties that are considered promising:

List of Hybrid Banana Plants and Immunity to Panama Disease.

- | | | | | | |
|----|---------------------|----|------------|-----|--|
| 1 | S.5 G. M. X Robusta | .. | 10 plants | .. | <i>Not immune.</i> Very tall tree. Very similar to Gros Michel. Bunches large, 10 hands. Flavour poor and heavy. |
| 2. | S.7 G.M. X Robusta | .. | 400 plants | .. | <i>Immune.</i> Leaves break in ratoons. Bunch and fingers small but improved by ratooning. Fingers 1 inch too short (first bunch 12 lbs., fourth bunch 35 lbs.). |
| 3. | S.13 G.M. X Robusta | .. | 30 plants | ... | <i>Immune.</i> Slender, short scattered fingers. Tree erect. |
| 4. | S.17 G.M. X Rob. | .. | 200 plants | .. | <i>Immune.</i> Very similar to S.7. Stem whitish and leaves more erect. |
| 5. | S.19 G.M. X. Rob. | .. | 100 plants | .. | <i>Immune. Very promising cross.</i> Tree very erect. Bunch with fingers well set for shipping. Fingers an inch too short, very fine flavour. Ripened colour, canary yellow. |
| 6. | S.20 G.M. X Rob. | .. | 18 plants | .. | <i>Resistant but not immune.</i> Very similar to G.M. in appearance of tree and fruit. Fingers well set, bunch fairly large. Favourable form for further trials and breeding. |
| 7. | S. 24. G.M. X Rob. | .. | 8 plants | .. | Interesting hybrid. Stem small and slender. Bunch fairly large, 7 hands. Finger long but slender. Flavour good. Colour of flesh, like plantain. The hands are produced high on the fruit stalk, close to the neck. Bunch therefore difficult to stow without damage. No ratoon fruit yet produced. Disease test not completed. |

8. S.27. G.M. X Rob.	.. 20 plants	.. Immune. Very similar to S.7.
9. S.28. G.M. X Rob.	.. 12 plants	.. Sturdy stout tree. Heavy leaves. Large fruit stalk, inclined to grow out from tree. Fingers stout but set at right angles to stem. Fingers not overlapping. Not yet ratooned. Disease test not completed.
10. S.29. G.M. X Rob.	.. 6 plants	.. Immune. Very similar to S.7. Flavour sub-acid.
11. S.34. G.M. X Rob.	..	Large tree with long and slender bunch. Fingers plum-like. Not yet ratooned. Disease test not completed.
12. S.39. G.M. X Rob.	.. 12 plants	.. Promising tree with regular bunch, suitable for shipping. Seven and eight hands. Flavour very good, slightly acid. Disease test not yet completed.
13. S.48. G.M. X Rob.	.. 11 plants	.. Strong stem, blackish, leaves well set. Fingers badly set. Flavour good. Disease test not completed.

1930 Seedlings.

(Disease test not yet completed).

14. G.M. X S.19.	.. 4 plants	.. Original cut back and three suckers taken. Shows good promise. Like G.M. in appearance.
15. G.M. X S.7.	.. 3 plants	.. Very promising. Sturdy plants. Like G.M. in appearance.
16. S.7 X G.M. (Glengoffe var.)		Very promising, but slow growth. G.M. type.

1931-32 Seedlings.

17. G.M. X. S.19	.. 4 plants	.. Strong.
18. G.M. (pink) X S.5.	.. 9 plants	.. Do.
19. S.5 X Rob.	.. 4 plants	.. Some with whitish leaves.
20. G.M. X Rob.	.. 7 plants.	.. Strong.
21. G.M. X S.7	.. 3 plants	.. Young plants, growing well.
22. G.M. X S.5	.. 4 plants.	
23. S.5 X G.M.	.. 1 plant.	
24. S.5 X Rob.	.. 7 plants.	
25. G.M. (pink) X S.40	.. 2 plants.	
26. S.13 X Rob.	.. 1 plant.	
27. Ramkela X S.7.	.. 4 plants.	
28. G.M. (pink) X S.7	.. 1 plant.	
29. S.7 X G.M. (Glengoffe)	.. 1 plant.	
30. G.M. (plantain) X S.7.	.. 3 plants.	
31. S.7 X Rob.	.. 1 plant.	
32. Sucrea X Rob.	.. 1 plant.	
33. S.40 X Lacatan	.. 1 plant.	
24. G.M. X Lacatan	.. 1 plant (1930).	

Note.—G. Michel varieties are pink G.M., the Glengoffe form, the form resembling the plantain, the Highgate and the Weeping-leaved forms.

Unfortunately about 90% of our bananas were blown down at Castleton in November, 1932. This affected the progress of pollination but this work is now being taken in hand with renewed vigour.

The Geneticist arrived in November and every assistance is being given for the furtherance of this work.

This work could not have been carried out without the ready collaboration and assistance so generously given by Mr. Bovell and his assistants. I have to acknowledge this with gratitude and the assistance given by the Superintendent of the St. Catherine Prison.

J. B. SUTHERLAND,
Supervising Inspector Plant Diseases.

VII.—AGRICULTURAL EDUCATION.

Report of Headmaster Government Farm School.

I have the honour to forward my Annual Report for 1932.

Attendance.—The students in attendance at the Government Farm School during the year were as follows:—

Easter Term	43
Midsummer Term	42
Christmas Term	37

Graduating Class.—The following students successfully completed the prescribed course at the School and were awarded Diplomas by His Excellency the Acting Governor, Sir Arthur Jelf, Kt., C.M.G., on July 7th, 1932:—

V. S. Barrett	Wakefield
J. H. Clarke	New Port
C. E. Edwards	Buff Bay
H. K. Flynn	Alderton
S. M. Jureidini	Buff Bay
A. R. King	Catadupa
A. B. McKenzie	Adelphi
A. L. Scully	Alley
L. V. Sequira	Retreat

This class was the first to receive the new Diplomas which were for the first time signed by His Excellency the Governor.

Prospectus.—A new illustrated prospectus of the School was printed and distributed to applicants. This prospectus gives in detail information regarding the aims of the School and outlines the courses offered.

The courses now included in each year are as follows:—

First Year.	Second Year.	Third Year.
Animal Husbandry	Animal Husbandry	Agricultural Economics
Arithmetic	Arithmetic	Animal Husbandry
Beekeeping	Beekeeping	Arithmetic
Book-keeping	Book-keeping	Beekeeping
Botany	Carpentry	Agricultural Chemistry
Carpentry	Chemistry	Chemistry
Chemistry	Dairying	Farm Management
English	English	Field Husbandry
Field Husbandry	Farm Mechanics	Farm Mechanics
Livestock Judging	Field Husbandry	Livestock Judging
Military Drill and Gymnastics	Livestock Judging	Metal Work
Physics	Military Drill and Gymnastics	Military Drill and Gymnastics
Poultry	Poultry	Soils
Veterinary Science	Veterinary Science	Surveying
		Veterinary Science

The new curriculum is working well and a course in all phases of agricultural work is now given at the School.

Grove Place.—The policy of having the Third Year Students spend half of each term in their last year at Grove Place was continued with success. The work given at Grove Place is proving to be an excellent method of rounding out the practical work of the courses offered at the School, and is of distinct benefit to the students.

Experiment Station.—The students in all years did practical work in Field Husbandry at the Experiment Station. This work included instruction in the proper cultivation of both major and minor crops and vegetables, as well as work in weed eradication, pruning and mulching and the preparation and application of insecticides and fungicides.

Stock Farm.—Students of all years received practical experience with livestock and farm machinery on the Stock Farm. This work included dipping, weighing, milking and feeding cattle, the operation of the engines on the Farm, buttermaking, silage making and the general operation of the Stock Farm. Cattle from the Farm are used in the Livestock Judging classes. The work on the Stock Farm proves of great value, and provides a means of the students securing at first hand, practical knowledge of the proper handling of livestock.

Apiary.—The apiary was moved to a location nearer to the School, and the enclosure was specially fenced. It is proposed to increase the apiary to twenty-five colonies. This phase of the work at the School is proving of benefit to the students and more attention is being given to it.

Visits.—Senior students at the School visited a number of places of interest both at Hope and at Grove Place during the year. The students at Hope visited the Citrus Packing House, Model Apiary, Coconut Producers' Factory, Caymanas Estates and several large coffee properties as well as several Small Settler's Holdings in St. Andrew and the surrounding parishes.

Sports.—A successful year in both cricket and football was completed. Matches were played with teams from Kingston and St. Andrew. All students in the School were encouraged to take part in the athletic activities.

Old Boys Cricket Match.—The Annual Cricket Match of the Old Boys versus the Present Boys was played on Saturday, June, 18th. This activity provides a means for the Old Boys to renew acquaintances and keep in touch with the School, and has long been one of the outstanding events of interest in the activities of the School.

Student Christian Movement.—The branch of the Student Christian Movement at the School completed a successful year's work. Credit for the success of this branch of the School activities is due to Mr. E. Hallett of the Y.M.C.A., who has always taken a keen interest in the religious welfare of the students.

Library.—An effort was made during the year to increase the number of books in the library for the students. While the library is gradually growing there is still need for an increased number of good books for the students.

I wish to record my appreciation of the co-operation which I have received from the members of the Staff of the Farm School and other branches of the Department throughout the year.

J. W. HOWE,
Headmaster.

Report of Medical Officer.

I have the honour to submit the following Report on the boys of the Farm School during the period September to December, 1932.

15 boys were medically attended and prescribed for.

2 employees were attended to.

1 boy was sent to Hospital for surgical attendance to his hand.

The usual visit to the School was made in September when the School opened for the session and the boys examined. They were found to be free from any infectious disease.

(Sgd.) R. G. SHERLOCK,
D.M.O.
February 28, 1933.

Report of Superintendent, Grove Place Stud Farm and Experimental Station.

I have the honour to present a summary of the work at Grove Place for the year 1932.

1. *Live Stock*—

Bulls: (Available for service to visiting Cows) 5.

1. Jersey Bull, "Glen."
2. Jersey Bull, "Etta's Pogis."
3. Jersey Bull, "Glen's Prefect."
4. Montgomery-Guernsey, "Cortes."
5. Montgomery-Brown Swiss, "Justice."

(The Ayrshire Bull "Food Controller," was superannuated and destroyed.)

Cows—

Pedigree	4
Grade	60
Heifers	66
Calves	18
Steers	2

Total 150

Calvings 47

Cattle drafted and sold 27

Horsekin1—

English Thoroughbred Stallion "Snow Boy"	
(Tredennis-White Weaverley—No. 1 Family.)	1
Imported Proof Ass, "Kentucky Boy"	1
Mares	9
Fillies	2
Colts	3
Gelding	1
Mules	12
Donkeys	7
Total	36

Service of Animals at the Stud:

Snow Boy	Visiting Mares	40	Farm Mares	4	Total	44
Kentucky Boy	Do. do.	6	Do. do.	3	Do.	9
Bulls	Visiting Cows	26	Farm Cows	67	Do.	93

Small Stock—

The following importations were made:

Sheep	1 Ram	Suffolk breed
Goats	1 Buck	} Toggenburg breed.
	3 Does	
Pigs	1 Boar	} Berkshire breed.
	2 Gilt	

(These animals are available for "public" service).
All animals maintained good health during the year.

2. *Experiment Station*.—Good progress has been made in the establishment of the Experiment Station. Four plots have been surveyed.

Plot A.—Coffee, bananas, miscellaneous collection of Citrus, canes, minor and truck crops, 7 acres in extent has been laid out.

Plot B.—5½ acres grapefruit grove (Marsh Seedless, Walters, Duncan and Triumph)—has been established.

Plot C.—25 acres Fodder Crops (Guinea and Indian Corn, Uba Cane) and Root Crops (Yam, Tannia, "Sweet" and "Irish" Potatoes, Cassava) is in process of establishment.

Plot D.—1½ acres of old Long Top Coffee is being reclaimed.

Section E.—Scattered old groves of Orange and Grapefruit trees. These have been cleaned and pruned.

3. *Nursery*.—A number of coffee seedlings and shade trees have been grown out and distributed.

Three plots of Seville Orange Seedlings have been budded to Marsh Seedless Grapefruit. (3,000 budded plants will be available for distribution in the fall of 1933.)

A plot of Seville Orange Seedlings was budded to Navel Orange.

A plot of Seville Orange Seedlings is being grown out to be budded in the spring of 1933.

Four beds of Seville Orange Seedlings are ready to be transplanted, and two squares of Seville Orange seeds have been sown.

4. *Treeplanting*.—1,000 young cedar trees were planted; the majority of them have "caught."

5. *Projects*.—The following projects have been initiated, (a) and (b) in conjunction with the Microbiologist):

(a) Testing of Agral and Shirlan, Burgundy and Cuprite on five different varieties of tomatoes for the control of "leaf mould."

(b) Testing of Agral and Shirlan, Burgundy, Bordeaux and Shade for the control of "Scab" on Seville Orange Seedlings.

(c) Comparative outgrowth and results of the following cover crops:—

Bengal Beans.

Jerusalem Peas.

Soya Bean (*Soja Max*).

Crotalaria anagyroides.

Crotalaria usaramoensis.

Tephrosia candida

Tephrosia Vogelii

Centrosema pubescens.

Indigofera endecaphylla.

Beggar Weed.

Volunteer Cover Crops.

(d) Tests of the efficiency and comparative cost of various proprietary sprays and emulsions for the control of pests in young Citrus groves.

6. *Agricultural Education*.—Five batches of senior students from the Farm School, Hope, were in residence for an aggregate of 28 weeks for instruction in practical work in Field and Animal Husbandry.

7. *General*.—Various minor structural improvements and additions to buildings and equipment were effected.

Two months of severe drought early in the year, an unusual heavy rainfall (badly distributed), and a heavy storm in November, adversely affected the work.

ARTHUR THELWELL,
Superintendent.
22nd February, 1933

VIII.—LIVE STOCK.

GOVERNMENT STUD FARM, GROVE PLACE, MANCHESTER.

Live Stock, Grove Place, December 31st, 1932—

- 1 Imported Jersey Bull
- 2 Native Pedigree Jersey Bulls
- 2 Grade Montgomery Bulls
- 1 Bull Calf of 1931
- 18—12 Bull Calves of 1932
- 4 —4 Pedigree Cows and Heifers
- 60—60 Native Cows
- 1 Grade Native Heifer
- 4 Grade Ayrshire Heifers
- 16 Grade Brown Swiss Heifers
- 12 Grade Guernsey Heifers
- 2 Grade Holstein Heifers
- 30 Grade Jersey Heifers
- 66—1 Grade Red Poll Heifer
- 2—2 Steers.

Horsekind—

- 1 English Thoroughbred Stallion, "Snow Boy"
- 1 Imported Proof Ass, "Kentucky Boy"
- 9 Brood Mares
- 2 Fillies
- 3 Colts
- 1 Gelding
- 12 Mules
- 7 Donkeys

36 head

Pigs—

- 1 Imported Berkshire Boar
- 1 Native Berkshire Boar
- 2 Imported Berkshire Sows
- 2 Native Berkshire Shoats

6 head

Goats—

- 1 Imported Toggenburg Ram
- 3 Imported Toggenburg Does

4 head

*Sheep.—*1 Imported Suffolk Ram.

The following is the summary of the valuation of Livestock at Grove Place on 31st March, 1932:—

Cattle ..	£1,156	0	0
Horsekind	561	0	0
Total	£1,717	0	0

Services of Bulls at Grove Place 1st January to 31st December, 1932.

No.	Bulls.	Visiting Cows.	Farm Cows.	Total.
1.	Jersey Bull "Glen"	2	12	14
2.	Jersey Bull "Etta's Pogis""	1	1	2
3.	Jersey Bull "Glen's Prefect""	4	34	38
4.	Montgomery-Guernsey "Cortes""	14	11	25
5.	Montgomery-Brown Swiss "Justice""	5	9	14
6.	Ayrshire "Food Controller""	..	1	1
		26	68	94

1932 IMPORTATIONS.

A. The following were imported from England for the Grove Place Farm and arrived in Jamaica on July 22, 1932:—

Berkshire Pigs—

- 1. Boar "Richings Bon Concord." Born April, 1931.
- 2. Sow "Ridgemoor Mistress." Born June 16, 1931.
- 3. Sow "Ridgemoor Prolific II." Born July 4, 1931.

B. The following were imported from England for the Grove Place Farm and arrived in Jamaica on November 18, 1932:—

Toggenburg Goats—

- 1. Ram "Stockwell Callum No. 12374." Born January 1, 1932.
- 2. Doe "Riding Cordelia No. 4238." Born April 8, 1929.
- 3. Doe "Widdington Wilhelmina No. 21." Born March 14, 1931.
- 4. Doe "Sahara of Weald No. 009." Born March 13, 1931.

Suffolk Sheep—

- 1. Ram "Tendring Token A.1095R." Born 1931.

GOVERNMENT STOCK FARM, HOPE.

*Live Stock, Hope Stock Farm, 1932.**Pedigree Stock:**Red Polls—*

Imported Red Poll Bulls	2	
Native Red Poll Bull Calves	3	
Native Red Poll Cows and Heifers	36	41

Jerseys—				
Imported Jersey Bull	..	..	1	
Native Jersey Bulls	..	..	2	
Imported Jersey Cow	..	..	1	
Native Jersey Cow and Heifers	..	..	25	29
Guernseys—				
Imported Guernsey Bull	..	..	1	
Native Guernsey Bull Calves	..	..	3	
Native Guernsey Cows and Heifer	..	..	6	10
Brown Swiss—				
Native Brown Swiss Cows	..	..	5	5
Montgomery—				
Imported Montgomery Bull	..	..	1	1
Holstein-Friesian—				
Imported Holstein-Friesian Bull	..	..	1	
Pedigree Holstein Bull Calf	..	..	1	2
Total Pedigree Stock	..	..		88
Graded Stock:				
Bulls—				
Grade Montgomery Bull and Bull Calves	..	..	13	
Grade Guernsey Bull and Bull Calves	..	..	3	
Grade Brown Swiss Bull Calf	..	..	1	
Grade Holstein Bull Calves	..	..	3	
Grade Jersey Bull Calves	..	..	4	24
Cows—				
Dairy Cows	..	..	130	
Foster Mothers	..	..	14	144
Heifers—				
Grade Native Heifer	..	..	1	
Grade Brown Swiss Heifers	..	..	15	
Grade Guernsey Heifers	..	..	41	
Grade Holstein Heifers	..	..	23	
Grade Jersey Heifers	..	..	28	
Grade Montgomery Heifers	..	..	13	
Grade Red Poll Heifers	..	..	6	127
Steers—				
Plough Steers	..	..		12
Total Grade Stock	..	..	307	307
Grand Total	..	..		395
Horsekind—				
Mules	..	..	19	
Poultry	..	..	1 pen Rhode Island Reds	
Bees	..	..	Nil	

Weekly Analysis of Milk supplied to the Public Hospital, Lunatic Asylum and General Penitentiary by the Hope Stock Farm, 1932.

Quarter ending.	Solids.	Fat.	Sp. Gravity.	Solids Not Fat.
March 31, 1932	13.67	5.01	1.0300	8.66
June 30, 1932	13.64	5.19	1.0291	8.45
September 30, 1932	13.94	5.40	1.0293	8.54
December 31, 1932	14.31	5.68	1.0294	8.63
	13.89	5.32	1.0295	8.57

The following is a summary of the Valuation of Live Stock at the Hope Farm to 31st March, 1932:—

Cattle	..	..	£8,121	0	0
Horsekind	..	..	296	0	0
Poultry	..	..	86	4	3
Total	..	..	8,503	4	3

1932 IMPORTATION.

The following was imported from England for the Hope Stock Farm and arrived in Jamaica on November 14, 1932:—

Red Poll Bull:	Newhall Theagenes 15864
Sire: ..	Bromley Champagne
Dam:	Tansor Kiora
Purchased from:	Capt. R. S. Hall, New Hall, Tendring, Essex, England
Cost ..	£359 1s. 9d.

Milk Yield, Dairy Herd, 1928, 1929, 1930, 1931, 1932.

		Imperial Quarts per diem.				
Month.		1928.	1929.	1930.	1931.	1932.
January	..	400.1	490.0	456.6	518.9	532.7
February	..	363.1	459.0	519.5	548.0	503.8
March	..	401.6	454.8	491.5	557.0	531.7
April	..	478.3	464.0	600.4	603.8	617.0
May	..	520.6	466.9	627.9	606.2	664.1
June	..	533.0	499.9	600.2	626.9	620.7
July	..	564.1	527.8	595.0	601.9	643.8
August	..	557.5	562.5	556.4	576.3	640.9
September	..	524.7	538.3	568.1	534.4	616.6
October	..	463.0	480.7	583.8	538.6	629.6
November	..	445.7	471.1	593.4	555.3	629.3
December	..	455.4	474.0	545.3	554.3	673.0
		474.7	490.8	561.5	568.5	608.6

Record of Dairy Herd Milk Yield, 1932.

Record of Dairy Herd in 1907, 1908.				
Month.		Av. No. of Cows.	Total Qts. per mensem.	Av. per Cow-Qts.
January	..	102	16513.4	5.2
February	..	98	14619.3	5.1
March	..	100	16483.6	5.3
April	..	105	18511.2	5.9
May	..	107	20586.0	6.2
June	..	108	18621.5	5.7
July	..	108	19957.6	5.9
August	..	108	19870.5	5.9
September	..	105	18499.4	5.9
October	..	107	19518.0	5.9
November	..	111	18879.2	5.7
December	..	116	20863.3	5.8
		106	18576.9	5.7

No.	Name of Cow.	Breed.	Age in years.	Average Content Milk Fat.	Yield in lbs.	Milking Weight.	Max. Yield Imp. Qts.	Sale Price at 7d. per qt. to 31.332 and 6d. per qt. thereafter.
1	Hope Beauty	Red Poll	6	4.2	9,044	1,500	20.8	£ 92 0 4
2	Marchioness 12th	Grade Montgomery	10	5.6	8,508	1,060	17.6	86 3 2
3	Norbrook 4th	Grade Jersey	7	5.4	7,995	1,040	17.7	77 14 10
4	Lydite 13th	Grade Holstein	10	4.6	7,050	1,120	17.1	69 13 9
5	Matilda 13th	Grade Guernsey	6	5.9	7,012	970	12.9	69 18 3
6	Paste 1st	Grade Jersey	7	4.6	6,795	800	15.4	69 5 4
7	Sayda	Jersey	9	4.9	6,648	950	19.9	67 3 2
8	Susuki	Grade Ayrshire	4	4.7	6,455	1,022	12.6	64 14 9
9	Lydite 4th	Grade Holstein	9	3.8	6,350	1,166	16.7	64 7 9
10	Diva 10th	Grade Guernsey	8	5.5	6,281	960	12.5	62 1 11
11	Perfume	Jersey	9	5.2	6,167	880	17.7	61 6 7
12	Quail 8th	Grade Jersey	7	5.7	6,083	900	18.8	58 13 10
13	Melba	Grade Guernsey	6	5.5	5,952	980	12.0	60 5 6
14	Kara 2nd	Grade Holstein	4	3.8	5,945	1,000	17.7	60 1 1
15	Bess 2nd	Grade Montgomery	8	5.0	5,896	1,056	17.9	57 5 10
16	May 4th	Grade Jersey	10	4.8	5,753	1,030	15.8	56 1 9
17	Mystery	Grade Jersey	11	4.6	5,743	946	14.0	58 6 7
18	Priores	Red Poll	8	4.4	5,685	1,010	11.0	57 16 10
19	Rosette 10th	Grade Montgomery	7	6.0	5,604	922	12.4	55 17 1
20	Baba	Grade Native	5	5.5	5,591	920	13.3	56 5 3
21	Hope Brisk 3rd	Red Poll	9	3.6	5,512	1,026	13.6	53 3 9
22	Marchioness 3rd	Grade Ayrshire	7	5.4	5,492	1,180	13.5	55 16 2
23	Hope Betty 5th	Red Poll	8	4.9	5,396	1,060	14.1	54 6 4
24	Hood's Ethelstine	Jersey	9	5.3	5,362	1,018	17.0	53 12 0
25	Perfect	Jersey	9	4.7	5,338	860	17.6	52 16 9
26	Quack	Grade Jersey	4	6.9	5,303	800	10.3	53 13 6
27	Lizzie 3rd	Grade Jersey	9	5.5	5,256	952	13.7	52 16 8
28	Tedco	Grade Red Poll	4	4.7	5,252	960	14.7	51 10 1
29	Dial	Grade Guernsey	4	5.5	5,226	1,020	9.7	52 19 0
30	Norbrook 3rd	Grade Holstein	8	4.8	5,212	1,160	16.3	52 15 7
31	Meadow	Grade Montgomery	9	6.4	5,207	1,230	14.7	50 12 7
32	Laurel	Grade Guernsey	4	4.4	5,192	1,280	13.6	51 11 5
33	Hood's Mead	Jersey	8	5.8	5,167	1,080	17.7	49 16 11
34	Maccaroni	Grade Guernsey	3	5.9	5,096	950	19.2	49 6 8
35	Hope Beta 3rd	Red Poll	12	4.8	5,078	1,030	11.0	49 15 10
36	Monica 15th	Grade Guernsey	7	4.9	5,065	860	16.7	49 10 9
37	May Fly	Grade Guernsey	7	6.1	5,046	930	16.1	49 2 1
38	Baby 2nd	Grade Montgomery	9	6.6	5,013	1,070	10.8	49 11 8
39	Abbess	Red Poll	9	4.7	5,006	1,240	18.0	51 15 3
40	Norbrook 5th	Grade Jersey	5	6.5	4,998	996	14.6	50 5 6
41	Pussy 2nd	Grade Red Poll	9	4.7	4,988	1,070	8.3	50 12 4
42	Tilda 4th	Grade Montgomery	10	5.6	4,982	1,140	12.4	50 17 3
43	Mermaid	Grade Ayrshire	4	5.4	4,922	984	16.0	47 10 0
44	Donorma	Grade Holstein	4	4.5	4,729	1,092	8.8	47 6 2
45	Monica 13th	Grade Guernsey	7	5.7	4,723	1,080	14.0	48 0 3
46	T. N. T.	Grade Guernsey	6	4.1	4,672	1,000	14.0	46 14 1
47	Hope Beta 5th	Red Poll	10	4.2	4,665	1,034	13.3	46 15 11
48	Glenlevit	Grade Jersey	4	3.9	4,613	728	11.5	46 7 5
49	Rosette 9th	Grade Guernsey	7	5.5	4,601	980	11.7	45 18 11
50	May 3rd	Grade Guernsey	11	4.2	4,536	1,070	11.3	45 15 7
51	Perilusta	Jersey	7	5.9	4,523	920	14.6	45 16 10
52	Bess 1st	Grade Guernsey	12	4.7	4,454	1,150	12.5	44 3 3
53	Selina	Jersey	4	5.9	4,445	858	11.9	44 11 0
54	Moco	Grade Guernsey	3	5.3	4,417	860	10.8	42 12 3
55	Veracity	Grade Guernsey	7	5.9	4,412	1,030	12.6	43 19 6
56	Conora	Grade Guernsey	5	5.1	4,369	1,068	14.9	44 1 8
57	Vickie C.	Grade Montgomery	9	5.6	4,294	1,132	14.7	42 2 8
58	Duco	Grade Guernsey	4	6.1	4,289	870	6.6	43 5 1
59	Milza	Grade Guernsey	5	4.5	4,284	920	11.7	43 3 10
60	Glen's Ethelstine	Jersey	3	5.4	4,247	736	10.0	42 18 5
61	Solitaire	Grade Jersey	4	5.8	4,228	1,034	7.6	42 14 5
62	Sherry	Grade Jersey	4	6.4	4,206	840	6.7	42 9 9
63	Ruperta's Betty	Red Poll	6	4.1	4,111	1,210	10.2	42 4 11
64	Berta	Red Poll	5	4.9	4,100	1,200	10.3	41 18 3

N. B. DONALDSON, Accountant.

H. H. Cousins, Director of Agriculture.

HOPE STOCK FARM, YEAR 1931-32, ENDED 31.3.32.

PROFIT AND LOSS ACCOUNT.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
To Depreciation—							By Livestock—						
Buildings ..	99	18	8				Cattle and						
Machinery ..	150	16	0				Mules	580	1	0			
Furniture and Fixtures	66	13	5				Poultry	10	12	5	590	13	5
Truck ..	30	0	0										
Tools and Implements	59	13	8				Milk	..			4,531	6	8
Vehicles and Harness	43	6	6	450	8	3	Butter	..			301	2	11
							Rents	..			181	3	3
Repairs and Upkeep—							Bombay Mangoes				208	19	5½
Buildings ..	39	2	11				Interest (Bank)				46	6	2
Machinery ..	53	11	10				Miscellaneous Revenue				60	0	2
Truck (including running expenses) ..	69	0	10										
Tools and Implements	46	18	3										
Vehicles and Harness	75	4	9										
General Repairs ..	339	18	7	623	17	2							
Food for Stock (Consumed) ..				1,652	13	1							
Plantation (Pines) ..				35	8	9½							
Miscellaneous Expenses ..				371	13	4							
Wages ..				978	15	5							
Growing Bombay Mangoes ..				5	3	6							
Cleaning and Fencing ..				486	15	4							
Taxes ..				10	12	0							
Accountant ..				125	0	0							
Clerk ..				100	0	0							
Foreman ..				115	0	0							
Rearing Calves at Grove Place ..				72	18	0							
Balance (net profit for the year) ..				891	7	2							
				£5,919	12	0½					£5,919	12	0½

N. B. DONALDSON,
Accountant.
H. H. COUSINS,
Director of Agriculture.

HOPE STOCK FARM, YEAR 1931-32 ended 31.3.32.

BALANCE SHEET.

<i>Assets.</i>	£ s. d.	£ s. d.	<i>Liabilities.</i>	£ s. d.	£ s. d.
Buildings—			Accounts Payable—		
As at 31.3.31	3,002 0 1		Treasurer for Canadian		
Additions ..	8 6 0		Agents ..	39 5 5	
			Fernando Castro	1 3 8	40 9 1
Depreciation	3,010 6 1	2,910 7 5	Jamaica Government—		
			Balance of Grant for		
Machinery—			purchasing Livestock	1,242 0 3	
As at 31.3.31	1,695 6 6		Less paid off during		
Depreciation	150 16 0	1,544 10 6	year by supplying one		
			Stallion to Stud Farm		
Furniture and Fixtures—			in Manchester	151 3 2	1,090 17 1
As at 31.3.31	1,041 16 7				
Additions ..	50 19 11		Profit and Loss—		
			As at 31.3.31	15,832 19 1½	
Depreciation	1,092 16 6	1,026 3 1	Add Profit for the year	891 7 2	16,724 6 3½
Truck—					
As at 31.3.31	150 0 0				
Depreciation	30 0 0	120 0 0			
Tools and Implements—					
As at 31.3.31	369 14 2				
Additions ..	33 17 7				
Depreciation	403 11 9	343 18 1			
Vehicles and Harness—					
As at 31.3.31	409 13 8				
Additions ..	2 14 0				
Depreciation	412 7 8	369 1 2			
Stores and Parts					
(Stock as per Inventory)		193 8 11			
Food for Stock—					
(Stock as per Inventory)		634 14 4			
Plantation—					
(2 acres Pines)		60 0 0			
Live Stock—					
(Cattle and Mules as per					
Certified Valuation	8,417 0 0				
Poultry as per Certi-					
fied Valuation	86 4 3	8,503 4 3			
Accounts Receivable—					
Public Hospital	40 5 0				
Jubilee Hospital	1 16 0				
Lunatic Asylum	69 14 2				
General Penitentiary	6 11 3				
Dr. J. Myers	1 6 8	119 13 1			
Cash—					
In Bank N. S.	2,029 0 6				
In hand ..	1 11 1½	2,030 11 7½			
		£17,855 12 5½			£17,855 12 5½

N. B. DONALDSON,
Accountant.H. H. COUSINS,
Director of Agriculture.

IX.—CHEMISTRY.

Report of the Deputy Island Chemist.

The total number of samples analysed during the year ended 31st December, 1932, was 3,286 and compares with the two former years as under:—

1930.	1931.	1932.
2,665	2,573	3,286

The samples are classified as follows:—

“A.” OFFICIAL SAMPLES.

(1) *Police*—

Human Viscera and Organs	..	..	91
Vomits	..	..	7
Excreta and Urine	..	..	2
Animal Viscera	..	..	11
Substances for poison	..	..	154
Coins, Genuine	..	..	107
“ Counterfeit	..	..	137
Counterfeiting Exhibits	..	..	152
Exhibits in Murder Cases—			
Revolvers (4) Shotguns (3)	..	..	7
Bullets (3) Shots (4)	..	..	7
Cartridges	..	..	49
Metals	..	..	14
Weeds (5) Powders (1)	..	..	6
Articles of Clothing	..	..	9
Arson Exhibits	..	..	28
Exhibits in Assault Cases	..	..	2

Under the Gunpowder and Firearms Law.

Dynamites	..	..	3
Detonators (8) Fuses (1)	..	..	9

Under the Spirit License and Rum Duty Laws.

Spirits, Rum, Whisky, etc.	..	..	114
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Under the Dangerous Drugs Law.

Opiums	..	..	18
Opium Exhibits, Pipes, etc.	..	..	167
Substances for Opium	..	..	43
Ganga	..	..	507
Ganga Exhibits, Pipes, Rags, etc.	..	..	25

Under the Medical Laws.

Medicines, Drugs, etc.	..	..	98
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Under the Drugs and Poisons Law.

Poisons (Lysol, etc.)	..	..	2
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Total .. 1,769

(II) *Customs and Excise*—

Native and other Wines	..	..	15
Rectified Spirits and Absolute Alcohols	..	..	13
Denatured Alcohols	..	..	27
Spirits, Rums, Rum Punches, Liqueurs, etc.	..	..	15
Condensed and Evaporated Milks	..	..	6
Flavouring Extracts and Essences	..	..	22
Fuel Oils	..	..	53
Gasolines	..	..	6
Disinfectants and Insecticides	..	..	12
Drugs, Chemicals, and Patent Medicines	..	..	18
Edible and Vegetable Oils	..	..	7
Revolvers (3) Cartridges (8)	..	..	11

Total .. 205

(III) *Department of Science and Agriculture*—

Animal Viscera (3), Stomach contents (1)	..	..	4
Feeding Stuffs	..	..	6
Insecticides and Fungicides	..	..	4
Butters (1), Soaps (1)	..	..	2
Plant (<i>Erythroxylum coca</i> for cocaine)	..	..	1

Total .. 17

(IV) Island Medical Office—			
Animal Viscera	..	..	1
Drugs	..	..	3
Whisky (1), Sheet Tin (1)	..	..	2
Total			6
(V) Medical Officers of Health—			
Kingston:			
Fresh Milks, genuine	..	..	1
“ “ adulterated	..	..	5
Total			6
St. Andrew:			
Fresh Milks, genuine	..	..	1
Other Parishes:			
Animal Viscera	..	..	2
Waters, potable	..	..	7
“ mineral	..	..	2
Syrups	..	..	1
Total			13
(VI) Kingston & St. Andrew Corporation—			
Waters	..	..	13
Coals	..	..	4
Tars	..	..	2
Standard solutions	..	..	12
Soils (3), Sewerage (1)	..	..	4
Total			35
(VII) Department of Public Works—			
Muds (2), Waters (1)	..	..	3
Mechanism (1), Deposits (2)	..	..	3
Total			6
(VIII) Sugar Industry Aid Board—			
Sugars (7), Syrups (3)	..	..	10
Miscellaneous	..	..	1
Total			11
(IX) Coconut Producers Board—			
Edible Oils (4), Dyestuffs (1)	..	..	5
(X) Government Printing Office—			
Type Metals	..	..	2
(XI) Surveyor General—			
Minerals	..	..	1
(XII) Administrator General—			
Documents	..	..	1
(XIII) Jamaica Government Railway—			
Deposits	..	..	1
(XIV) Island Treasury—			
Coins, counterfeit	..	..	1
(XV) Government of British Honduras—			
Waters	..	..	6
Total Official			2,085

“B.” AGRICULTURAL.

No analyses were undertaken under this heading, the analyses of Soils, Manures, etc., being now undertaken by the Agricultural Chemist.

"C." GENERAL.

Stock Farm Milks	..	..	859
Cattle Dips	..	..	69
Sugars	..	..	115
Rums	..	..	45
Cane Juices and Distillery Products	..	..	10
Molasses	..	..	7
Waters, potable	..	..	11
Fresh Milks and Creams	..	..	9
Condensed Milks	..	..	10
Ores and Minerals	..	..	10
Steam Coals	..	..	4
Fertilizers and Feeding Stuffs	..	..	4
Chemicals and Drugs	..	..	5
Wines (4), Beers (2)	..	..	6
Essential Oils	..	..	3
Soaps	..	..	3
Butters	..	..	2
Baking Powders	..	..	2
Fuel Oils	..	..	2
Animal Viscera	..	..	4
Substances for Poison, Foods, etc.	..	..	10
Miscellaneous	..	..	11
Total			1,201
Grand Total			3,286

The 91 analyses of human viscera and organs, and 9 of vomits, excreta and urine, were made in connection with 48 deaths. In 36 cases poison was found and determined in the viscera, as follows:—

- (1) Traces Yellow Phosphorus from viscera of a female child.
- (2) 0.0012 grains Yellow Phosphorus in organs of a female adult.
- (3) 0.0014 grains Yellow Phosphorus in organs of a female adult.
- (4) 0.0307 grains Yellow Phosphorus in organs of a female adult.
- (5) 0.0075 grains Yellow Phosphorus in organs of male child.
- (6) Large traces Yellow Phosphorus in viscera of a female.
- (7) 0.01 grains Arsenic in organs of a male adult.
- (8) 0.15 grains Mercury in organs of a male adult.
- (9) 0.22 grains Mercury in organs of a female adult.
- (10) Large traces Lead in the viscera of a female adult.
- (11) Large traces Lead in the viscera of a male infant.
- (12) Large traces Lead in the viscera of a male child.
- (13) Large traces Mercury in the organs of a female adult.
- (14) Traces Zinc in the organs of a male adult.
- (15) Traces Yellow Phosphorus in the viscera of a female child.
- (16) 0.0025 grains Arsenic in the viscera of a male adult.
- (17) Large traces Lead in the viscera of a male adult.
- (18) Large traces Mercury in the viscera of a male child.
- (19) Traces Mercury in the organs of a female child.
- (20) Traces Arsenic in the viscera of a male adult.
- (21) Traces Arsenic in the viscera of a male child.
- (22) Traces Arsenic in the viscera of a female child.
- (23) 0.02 grains Arsenic from the organs of a male suicide.
- (24) Traces Carbolic Acid in the viscera of a male adult.
- (25) 9.65 grains Arsenic from the organs of a male suicide.
- (26) Traces Aconitine from the viscera of a female adult.
- (27) 0.006 grains Arsenic from the viscera of a female adult.
- (28) 0.0067 grains Antimony from the organs of a male child.
- (29) 0.084 grains Antimony from the organs of a male child.
- (30) 0.0042 grains Antimony from the organs of a female infant.
- (31) 0.003 grains Antimony from the organs of a female infant.
- (32) 0.006 grains Arsenic from the viscera of a male infant.
- (33) 0.01 grains Arsenic from the organs of female child.
- (34) Resinous substance of the nature of Shellac from the stomach and contents of a male adult.
- (35) 0.375 grains Antimony from the organs of a female child.
- (36) Traces of an acrid oil resembling Croton or Physic Nut Oil from the organs of a male child.

The substances examined for poison which gave positive results were as follows:—

- (1) Traces Yellow Phosphorus on 2 ripe bananas.
- (2) Traces Yellow Phosphorus on boiled banana skins.
- (3) Yellow Phosphorus in water used for the above.
- (4) Boric Acid in a powder suspected to have been used in poisoning a cow.
- (5) Yellow Phosphorus in a vial containing vermin paste used to destroy a cow.
- (6) Asafoetida in a liquid suspected to have been used in a poisoning case.
- (7) Arsenic in a sample of Cattle Dip.

- (8) Traces of Yellow Phosphorus on a piece of stick, cloth, and paper used in a poisoning case.
- (9) Lead Acetate in a lotion suspected to have been used to effect a poisoning.
- (10) Carbolic Acid in a vial.
- (11) Carbolic Acid in a mixture of Chocolate and Milk.
- (12) Carbolic Acid in a piece of bun.
- (13) Yellow Phosphorus in 2 water coconuts.
- (14) Antimony in 3 ripe bananas.
- (15) Arsenic in a Rat Poison.
- (16) Ultramarine in cooked cocoas suspected of being poisoned.
- (17) Calomel in a powder suspected of causing the death of two children.
- (18) Cooper's Dip (Arsenic) taken from the person of a male suicide.
- (19) Lysol from a bottle containing liquid in a case of attempted suicide.
- (20) Arsenic in a powder purchased from a local druggist.
- (21) $5\frac{1}{2}$ grains Permanganate of Potash per fluid oz. in a liquid used in a case of attempted suicide.
- (22) 13 grains Carbolic Acid in porridge used in an attempt at poisoning.
- (23) 200 grains Zinc Sulphate in a liquid used in an attempt at poisoning.
- (24) 0.2 parts Arsenic per million in a tank water.
- (25) White Arsenic in a powder used to destroy a pig.
- (26) White Arsenic in cooked cornmeal used to destroy a pig.
- (27) Arsenic and Phenols in cooked food poisoned with Cooper's Dip.
- (28) Zinc equivalent to $1\frac{1}{2}$ ozs. Zinc Sulphate in cooked food.
- (29) Turpentine in water suspected of being poisoned.
- (30) Liver of Sulphur in 2 waters suspected of being poisoned.
- (31) Arsenite of Soda in 2 tank waters which had been poisoned.
- (32) Powdered Glass in a corn dumpling and a mortar.
- (33) Powdered Glass in a quantity of a powdered substance.
- (34) Nitrate of Soda in 2 powders sold as Glauber's Salts.
- (35) 0.21 grains Yellow Phosphorus in cornmeal porridge.
- (36) Resinous substance of the nature of Shellac in rum.
- (37) 9 grains Powdered Glass in rice and peas.
- (38) Powdered Glass in fibres of cloth.
- (39) Powdered Glass in cooked rice.
- (40) 13.5 grains Iodoform in cooked food.
- (41) Arsenic in a sample of water used in an attempt at poisoning.
- (42) 73 grains of powdered glass in porridge.
- (43) 20 grains of White Arsenic in a sediment in a water jar.
- (44) 70 grains of Powdered Glass in cooked food.
- (45) Traces of Powdered Glass in food.
- (46) 45 grains of Powdered Glass in food.

During the year 287 Certificates were issued to the Police Department being an increase of 17 over last year and 73 over 1930.

Human viscera and organs submitted numbered 91 as compared with 104 for the previous year.

154 substances were submitted for test for poisons which is an increase of 19 over the previous year and 66 more than the number for 1930. Details are given in 46 cases described above.

Out of 244 coins examined, 137 were counterfeit and were composed chiefly of alloys of Tin.

The examination of firearms and bullets in connection with cases for murder necessitated a large amount of experimental work; tests were carried out on firearms taken from suspects and also on other firearms of similar make.

During the year an Ultra-violet ray lamp was installed which has proved of great utility in the examination of a variety of exhibits submitted for scientific criminal investigation.

12 samples were examined under the Gunpowder Law, and these consisted chiefly of dynamite and detonators.

The number of samples of Spirits and Alcoholic Liquors submitted in cases of Breach of the Spirit License Law, showed a great increase over former years, 114 samples being submitted as against 7 for last year.

Under the Dangerous Drugs Law both Opium and Ganga exhibits showed a great increase as compared with last year, the Ganga exhibits being 532 as against 211 for the year 1931. Most of the Ganga seized by the Police appears to be grown in St. Catherine and St. Mary at the present time whereas in former years the parish of St. Thomas was also prominent. Opium and opium exhibits numbered 228 as against 121 for last year.

98 samples of quack medicines were analysed in connection with prosecution for Breach of the Medical Laws. These comprise decoctions of herbs, common drugs, salines, and occasionally alcoholic extracts of various insects.

Two samples were submitted under the Drugs and Poisons Law, and these consisted of a quantity of Arsenic which was sold in an improperly labelled package, and a bottle of Lysol.

For the Customs Department a total of 205 samples were analysed, being an increase of 37 more than the number for last year. Samples of alcoholic liquids for drawback show a decrease owing to lessened exportation of native made alcoholic beverages.

Most of the other articles examined for the Customs call for no comment as they are much the same as in former years.

Some cartridges which were seized by the Customs were found to be "Tear Gas" cartridges which were filled with solid para-dichlor-benzene. In consequence of this seizure the Regulations prohibiting the importation of firearms and cartridges for use in connection with the firing of "Tear Gas" preparations were amended and made wider in their scope.

Seventeen samples were analysed for the Department of Science and Agriculture, being a decrease of 14 as compared with last year.

The number of samples submitted by the Island Medical Department and also by the Medical Officers of Health also show a decrease, being a total of 25 as against 47 for 1931.

A sample of syrup taken from a Mineral Water Factory was found to be heavily charged with Salicylic Acid, despite the Regulations prohibiting the use of this preservative in food-stuffs.

For the Department of Public Works a total of 6 articles were examined. Two deposits which were found inside the mechanism of an automatic acetylene light for the use of navigators were found to be wind borne sand, and examination of the mechanism of the light control showed how this material gained access to the interior of the machine. Suggestions were made whereby the lights could be improved by better filtration of the air supply and elimination of the trouble caused by the presence of fine sand particles in the air.

Two type metals were analysed for the Government Printing Office with a view to renovating the quality of their stereotype metal.

A document was examined on behalf of the Administrator General in connection with a bankruptcy and ample proof that the date on the original document had been altered, was obtained from examination of the ink employed.

Articles were examined and analyses made for other Government Departments, but these call for no particular comment.

Six samples of water were examined on behalf of the Government of British Honduras with a view to extension of the water supply in certain districts.

GENERAL.

Under this heading a total of 1,201 samples were analysed as compared with 1,280 for last year.

Stock Farm milks numbered 859 as against 871 for 1931.

69 Cattle Dips were examined for standardisation of the contents of Dipping Tanks, and where necessary the quantities of ingredients necessary to add to bring to standard strength were recommended.

The number of sugar and rum samples has again shown a decrease, only 115 sugars being submitted as against 149 for last year, and 45 rums as against 56 for 1931.

With the exception of Stock Farm milks and Cattle Dips the samples under this heading are analysed for the public on receipt of fees payable under the approved Schedule.

The variety of samples received is shown by the tabular statement given above.

Of animal viscera analysed under this head the following are the results in which positive evidence of poison were obtained:—

- (1) Traces of Yellow Phosphorus in the organs of a cow.
- (2) Morphine in the viscera of a horse.
- (3) Prussic Acid in the viscera of two kittens.
- (4) Arsenic in the viscera of three pigs.

The manufacture and sale of Paranaph and Fly Killer was continued throughout the year. The sale at cost price of various insecticides and fungicides to the public was also carried out as usual and the supply of Standardised Iodine Solution and chemicals for testing Cattle Dips was maintained.

The following table shows the nature and amounts of materials issued to the public for the past three years.

	1930.	1931.	1932.
Paranaph	33,512	36,770	34,965 lbs.
Arsenite of Soda	20,175	25,499	22,021 lbs.
Copper Sulphate	70	160	567 lbs.
Carbon Bisulphide	516	669	1,174 lbs.
Rat Poison, bulk	162	175	225 lbs.
“ “ 1 oz. pkts.	65	169	170 pkts.
Standard Iodine	41,750	39,000	40,750 ccs.
Thymol Powders	466	199	441 ozs.
Starch Solution	211	221	209 bottles
Soda Bicarbonate	48	52	30 bottles
Cyanogas	76	170	42 lbs.
Fly Killer	194	53	132 gallons

The Receipts for Laboratory Fees and Sales for the past three years are as follows:—

	1930.	1931.	1932.
	£ s. d.	£ s. d.	£ s. d.
Fees	274 3 6	191 18 0	221 10 9
Sales	841 8 3	989 10 7	928 13 11

The Laboratory Staff at present consists of the Deputy Island Chemist, Assistant to the Deputy Island Chemist, two Technical Assistants and two Apprentices and also the Clerk and Storekeeper.

During the year Mr. S. N. Bryan, Apprentice, terminated his period at the Laboratory and was replaced by Mr. G. A. Little.

W. L. BARNETT, M.A., B.Sc., F.I.C.,
Deputy Island Chemist.

Report of the Agricultural Chemist.

A.—AGRICULTURAL CHEMISTRY AND SOILS.

1. INTRODUCTION.

The Agricultural Chemistry Laboratory was first available for use on 9th March, 1932.

The period before the laboratory was available was utilised, firstly, in equipping and fitting the new building, and, secondly, in visiting estates throughout the island in order to obtain a general knowledge of local conditions. A summary of the impressions gained during these visits was embodied in a special report which was submitted to the Jamaica Imperial Association. Sufficient information was obtained to enable a provisional scheme of field experiments to be compiled.

The work of the laboratory has been largely concerned with the examination of soils obtained throughout the island, with a view to determining the manurial deficiencies.

Certain technical difficulties with regard to the laboratory treatment of the highly calcareous soils, which frequently occur in Jamaica, are being overcome.

In addition, the analysis of all samples of material of agricultural interest submitted to the Department has been undertaken. Whenever possible agricultural advice has been given with regard to the results of the analyses. A considerable amount of general advisory work has been undertaken. It has mainly concerned problems connected with artificial manures.

The appreciation of the importance of irrigation has been reflected in the number of water samples submitted for analysis. In this connection, observations of the effects of irrigation on certain soils have been made. Advice with regard to the operation and chemical control of sugar factories has come within the scope of the work and appropriate suggestions have been submitted to planters. An increasing interest in the chemical aspect of sugar manufacture, which should eventually influence the economics of the local sugar industry has been apparent.

The question of the properties of the various seedling cane varieties and their yielding power has received attention.

A more detailed account of the work accomplished is given in subsequent paragraphs.

2. SOIL SCIENCE.

(a) General.—The period immediately following the opening of the laboratory was occupied in standardising apparatus and methods and in training assistants in their use.

Except in a few isolated areas, no systematic study of soils on modern lines has been made hitherto in Jamaica. It has been necessary, therefore, to commence the present study in the elementary stages. The work has fallen into three closely related divisions, namely (1) a classification of the main soil types, (2) a determination of the chemical and physical characteristics of each type, (3) a determination of the manurial requirements of each of the chief crops on each type, respectively. Existing circumstances and the immediate demands of planters for assistance in manurial problems rendered a systematic survey in a logical order difficult. A general knowledge of the main soil types is, however, essential for a study of manurial problems. Whenever possible, therefore, when soil sampling was required in connection with such problems, samples were taken in sufficient detail to afford information relative to the characteristics of the soil type. By this means a fundamental knowledge of the soils of Jamaica will be accumulated. The work is increased by the absence of any large areas of soil of consistent composition and by the frequent occurrence of several types of soil within a small area.

A great interest has been shown by planters in the examination of their soils, and applications to have soils examined have been in excess of the capacity of the laboratory for dealing with them.

The work of obtaining information concerning the characteristics of soil types was greatly assisted by a visit from Prof. Hardy of the Imperial College of Tropical Agriculture. A tour of the island was arranged for Prof. Hardy, during which, through the kindness of planters, inspections were made and samples obtained of the main soil types of the island. A report will be issued on the results of the examination of the samples which should add materially to the knowledge of the soils in Jamaica.

(b) Summary of Laboratory Work.—

Soil Samples obtained	661
Total Determinations made on samples ..	2,618
Reports issued on Soil Determinations ..	14

The figures given are for the period of ten months commencing in March, 1932. The preparation of the sample for analysis necessitates a certain lapse of time between sampling and the commencement of the analysis. A number of samples obtained late in 1932 but not analysed until 1933 were therefore omitted in compiling the above figures.

(c) Methods.—The analytical methods adopted in the examination of the samples are mainly those indicated in "The Cacao Soils of Tobago" (F. Hardy, C. G. Akhurst, G. Griffiths, Trop. Agric. Suppl. 1931.) The methods combine simplicity and rapidity, and thereby enable a relatively large number of samples to be examined. An electrolytic method for determining chloride in soils and waters was used. (R. J. Best, Journ. Agric. Sci. xix, 1929, 533).

An alternative method of estimating the phosphoric acid in a citric acid extract of soil has been devised. The method is a combination of a method due to A. Nemeć (Brit. Chem. Abs.—B.80, 1931) and one due to R. G. Warren and A. J. Pugh (Journ. Agri. Sci. xx, 1930, 537) and appears to include the advantage and avoid the disadvantages of both methods.

3. GENERAL AGRICULTURAL ANALYSIS.

The following samples of agricultural interest were submitted for analysis during the year.

Bat Guanos ..	35
Inorganic Manures ..	2
Limestones ..	7
Irrigation Waters ..	8
Total ..	52

In most cases a covering advisory letter interpreting agriculturally the analytical results was sent with the Certificate of Analysis.

The large number of samples of bat guano submitted indicate the interest shown in this local manurial product. With few exceptions the samples have been of a poor quality, and have contained less than two per cent. of total nitrogen. A few samples have contained over twenty per cent. phosphoric acid.

Several samples of bat guano have been submitted which have proved to be not representative of the bulk deposit in the cave from which they were taken. The composition of a guano deposit varies considerably with depth and position. A composite sample formed by mixing small samples obtained by sampling at various points in a deposit will on analysis, only afford some indication of the average value of that deposit. The composition of a large amount of mixed guano removed from the cave may not necessarily be same as that of the initial sample.

The limestone samples submitted were, with few exceptions, of excellent quality for agricultural purposes.

A number of irrigation water samples were highly saline.

I wish to take this opportunity of acknowledging the valuable assistance given by the Deputy Island Chemist in placing at my disposal the resources of his experience and laboratory during the somewhat difficult process of equipping a new laboratory.

4. MISCELLANEOUS.

(1) The preliminary arrangements for conducting a survey of the yields given by the seedling varieties of cane have been completed. There are indications that these varieties behave very differently under the various conditions of soil and climate existing in Jamaica. The objects of the survey are, therefore, (a) to obtain the yields given by the different varieties in the different sugar-producing areas, and thereby obtain some indication of the most suitable variety for each district, (b) to obtain indications from the deficiencies of known varieties of the physiological requirements of an ideal variety, and thereby assist the cane breeder, (c) to obtain a record of the yield of cane throughout the island from year to year and thereby obtain some indication of the effect of annual variations in climate on the different varieties. Varietal trials will be performed in connection with this survey at as many centres as possible.

(2) Steps towards obtaining and testing an instrument which can measure the purity of cane juice in the field have been taken.

(3) Demonstrations of a simple method of controlling the liming of cane juice in the factory have been given.

(4) Numerous letters of enquiry concerning agricultural problems have been received and answered. Most letters have concerned the mode of application, the mixing, and the general effect of artificial manures. Liming of the soil has been the subject of many enquiries.

(5) Preliminary arrangements for investigating a new and simple method of preparing silage are being made.

5. PUBLICATIONS AND LECTURES.

A Report on a Survey of the Sugar Producing Areas of Jamaica was compiled.

Articles have been contributed to the Journal of the Jamaica Agricultural Society.

Lectures have been delivered to the Jamaica Imperial Association, and to the Instructors of the Agricultural Society.

A laboratory demonstration was given to the members of the Jamaica Agricultural Society.

Mr. Martinez, Acting Superintendent of Agriculture, has assisted in the work reported above. He has been responsible for a considerable proportion of both the laboratory and field work, and has contributed valuable assistance in both divisions.

B. MANURIAL EXPERIMENTS.

1. INTRODUCTION.

An active interest in the use of artificial manures is being shown by all members of the planting community in Jamaica. There is, however, very little reliable information available concerning the use of artificial manures, particularly with regard to the most profitable amount to apply to any given crop. Past experiments and acute observations by planters have furnished some indications of the type of manure required. Even so, much of the evidence appears contradictory. It appears that considerable sums of money are being wasted in Jamaica at the present time by the application of either unsuitable manures, or of unsuitable quantities of manure.

The large amount of information necessary to place the use of artificial manures on a strictly economic basis can only be supplied by a comprehensive system of field experiments distributed throughout the island. While chemical examination of the soil will give indications of soil deficiencies, manurial experiments are required to determine the most profitable applications to give. A combination of soil examination and field experiments is the ideal method of approaching manurial problems.

The existence of diverse types of soil under widely differing climatic conditions makes the preparation of a general programme of manurial experiments for the island difficult. Conditions do not allow for conducting the complex experiments necessary for determining the best mixture and the optimum dressing simultaneously.

Programmes of experiments, as comprehensive as practical considerations will permit, have been prepared. The scope of the experiments put into operation each year will of course be influenced by the results of previous experiments. To obtain results as rapidly as possible, a number of qualitative experiments have been included in the initial programme.

The general form of the experiments has been revised and a type new to the island introduced. The lay-out has been based on the scientific fact that in experiments of this type more accurate results are obtained by using a large number of replications of small plots than by using a few replications of large plots. This is particularly the case under existing conditions where the lack of uniformity in the soil makes a large number of replications essential. Whenever possible, therefore, the Latin square form of experiment has been used.

2. SUGAR CANE.

It has been possible to put the major portion of the experimental scheme drawn up for sugar cane into operation through the generous co-operation of planters. As wide a range of soils and climatic conditions have been covered as possible. For qualitative experiments, a Latin square containing five treatments and therefore twenty-five plots, was adopted as the most suitable form. Each plot is one-tenth of an acre in area. To simplify these experiments mixtures of elementary manures only have been used. The following are the five treatments:—

- A. Control (No manure)
- B. 3 cwt. Sulphate of Ammonia per acre (N)
- C. 3 cwt. Sulphate of Ammonia plus 1 cwt. Sulphate of Potash per acre (N + K)
- D. 3 cwt. Sulphate of Ammonia plus 1 cwt. Superphosphate per acre (N + P)
- E. 3 cwt. Sulphate of Ammonia plus 1 cwt. Superphosphate plus 1 cwt. Sulphate of Potash per acre (N + P + K).

The results should provide the following information: The effect on yield of (a) Ammonia Nitrogen, (b) a mixture of nitrogen and potash, (c) the addition of potash to nitrogen, (d) a mixture of nitrogen and phosphate (e) the addition of phosphate to nitrogen, (f) the addition of potash to a nitrogen-phosphate mixture, (g) the addition of phosphate to a nitrogen-potash mixture. It is appreciated that with these treatments an apparent negative result may not necessarily prove that the manure concerned is of no value, but under the imposed conditions the above arrangement appears to cover as wide a range of possibilities as possible. The arrangement also provides a certain amount of double checking within the experiment.

The following experiments have been laid down:—

Qualitative (of the type above)	8
Quantitative	2
Miscellaneous	7
Co-operative	2

The miscellaneous class includes experiments for comparing the effects of bat guano and an equivalent inorganic mixture; Sulphate of Ammonia and Nitrate of Soda: for studying the effects of molasses, of potash alone, and of phosphate alone.

Two experiments have been reaped, both of the qualitative type. The treatments applied are those already described.

Experiment 1.—Worthy Park, Long Corner No. 2:

Canes: BH 1012

Soil: Acid, yellow clay containing shot.

(a) Yield Data.—

TABLE I.—Yield in cwt. to the nearest quarter.

C	E	D	B	A
71.25	73.75	78.0	71.0	61.0
D	B	A	C	E
54.5	63.0	53.25	66.5	62.75
A	D	C	E	B
50.0	50.25	57.5	64.75	53.0
E	A	B	D	C
45.5	37.0	42.25	47.75	56.5
B	C	E	A	D
39.5	44.0	51.75	42.5	48.5

(b) Analysis of Data—

TABLE II.—Analysis of Variance.

Due to	Degrees of Freedom.	Sum of Squares.	Variance.	$\frac{1}{2} \log_e$
Treatments ..	4	398.25	99.56	2.300
Rows ..	4	2294.70	573.67	
Columns ..	4	128.10	32.25	
Random ..	12	225.39	18.78	1.466
Total ..	24	3046.44		

Standard Error = 4.33
Significant Difference = 5.97 cwt. per plot
= 2.98 tons per acre.

Any increase in yield greater than 2.98 tons per acre will most certainly be due to the manures, not to coincidence in the arrangement of the plots in this field of varying fertility.

(c) Results—

TABLE III.—Mean Yield in Tons per Acre.
Difference from

Manurial Treatments.	Mean Yield.	Tr. A	Tr. B	Tr. C	Tr. D.
A. No manure	24.37				
B. N.	26.87	2.50			
C. N. K	29.57	5.20*	2.70		
D. N. P	27.9	3.53*	1.03		
E. N. P. K	29.85	5.47*	2.98*	0.28	1.95

Increase in yield highly significant marked *.

The following conclusions may be drawn:—

(1) Sulphate of Ammonia has given a small increase in yield which might be due to chance arrangement of the plots once in ten times. Since the addition of Superphosphate to Sulphate of Ammonia has produced no significant increase in yield over the Sulphate of Ammonia treatment, it is probable that the increase in yield due to treatment D is caused solely by the Sulphate of Ammonia. It appears probable, therefore, that treatment B has produced some increase in yield.

(2) Sulphate of Potash on addition to Sulphate of Ammonia has increased the yield significantly. The increase in yield due to treatment E is probably due to the effect of the nitrogen and potash it contains and not to the effect of the phosphate.

(3) Superphosphate on addition to the Sulphate of Ammonia has not increased the yield significantly. No increase in yield has occurred on the addition of phosphate to the nitrogen-potash mixture.

(4) General.—The best manure to apply to a soil of this type appears to be a mixture containing nitrogen and potash. The optimum proportions of the constituents in the mixture and the optimum size of the dressing to be applied have not yet been determined. The optimum mixture would appear to contain a lower proportion of nitrogen than the one used in this experiment. Superphosphate has produced no obvious increase in yield.

It is regrettable that facilities were not available for comparing the purities of the juices produced by each treatment.

Experiment 2. Georgia Estate, Charles Piece.

Canes: Native old ratoons.

Soil: Friable, yellow clay containing shot.

Lay-out:—Owing to the peculiar shape of the available field, it was found more convenient to use the system of randomised blocks rather than a Latin square.

(a) Yield Data—

TABLE I.—Yield in cwt. per plot.

Blocks.		Treatments.				
		A.	B.	C.	D.	E.
I	..	35.27	34.60	42.19	37.50	35.05
II	..	34.82	37.72	40.63	37.28	36.19
III	..	35.72	39.74	44.87	40.63	38.17
IV	..	39.96	35.72	41.30	38.40	46.21
V	..	33.71	42.41	42.64	39.28	44.42

(b) Analysis of Data—

TABLE II.—Analysis of Variance.

Due to		Degrees of Freedom.	Sum of Squares.	Mean of Squares.	$\frac{1}{2} \log_e$
Between Treatments	..	4	114.310	28.58	1.676
Within Treatments	..	20	176.750	88.375	
Between Blocks	..	4	58.090	14.522	
Random	..	16	118.660	7.416	1.018

Standard Error = 2.73

Significant Difference = 3.65 cwt. per plot or
1.83 tons per acre.

Any increase greater than 1.825 tons per acre will almost certainly be due to the manures and not to coincidence in the arrangement of the plots in this field of varying fertility.

(c) Results—

TABLE III.—Yields in Tons per Acre.
Difference from

Manurial Treatments.	Mean Yield.	Tr. A.	Tr. B.	Tr. C.	Tr. D.
A. No manure	17.94				
B. N	19.02	1.08			
C. N. K	21.16	3.22*	2.14*		
D. N. P	19.31	1.37	0.29		
E. N. P. K	20.02	2.08*	1.00	..	0.71

Increases in yield which are significant marked*.

If the results given in Table III are compared with the results given in the corresponding table of the Worthy Park Experiment, it will be noticed that they are very similar from a qualitative point of view. It appears unnecessary therefore to recapitulate the observations made on the results of the former experiment. Quantitatively, the Worthy Park Experiment gives greater results than the Georgia Experiment. The results have received a similar mathematical treatment to those of the Worthy Park Experiment.

Acknowledgment is due to the planters concerned for placing every facility for performing the experiments accurately at the disposal of the officers of the Department.

3. BANANAS.

There has been an increasing interest in the artificial manuring of bananas during the year. Many enquiries as to the type and quantity of manure required have been received. There is, however, a complete absence of reliable information as to the reaction of bananas to artificial manures.

Numerous fundamental field experiments are necessary to place the manuring of bananas in Jamaica on a strictly scientific basis. Available conditions and the necessity for relatively rapid results preclude the immediate performance of such experiments. The more general problems which are in need of solution are (1) the possibilities of improving the grading of bunches from relatively poor fields by the use of artificial manures, (2) the possibilities of improving the marketable qualities of the fruit and of the bunches, generally, (3) the relative values of inorganic and organic manures including green manures, (4) the possibilities of increasing the population in a field while maintaining the grade by the use of artificial manures, (5) the most economical manure to use in each case, (6) the determination of an ideal cover crop for bananas. These problems may have to be solved separately for each of the main soil types on which bananas are grown. It is apparent that numerous carefully controlled experiments will be necessary to obtain even an indication of the solutions of these problems. A scheme of experiments embracing many of these questions has been designed, but mainly owing to the considerable supervision during reaping, it has not been possible to put many experiments into operation.

One experiment, somewhat of the qualitative type used with sugar cane, has been laid down. Several more experiments are being inaugurated in the near future.

The Field Experiments Committee of Trinidad very kindly submitted, on request, a lay-out for a manurial experiment with bananas, based on mathematical and practical conditions. I wish to acknowledge the interest and trouble the members of that Committee took in furnishing the suggestions.

4. CITRUS.

A scheme for manurial experiments with citrus has been drawn up, but it has not been possible to put it into operation. One progressive citrus planter is undertaking one experiment. It is anticipated that this co-operative experiment will be commenced during the coming year.

Mr. Goodman, Superintendent of Public Gardens and Mr. Martinez, Acting Superintendent of Agriculture, have contributed valuable assistance in the laying-out and reaping of the experiments. It is by reason of their assistance that it has been possible to put such a comprehensive scheme of experiments into operation.

H. H. CROUCHER.

X.—STAFF.

Mr. H. H. Cousins, Director of Agriculture, left the Island on leave on the 22nd June, and finally retired from the Public Service on the 22nd September.

Dr. S. Lockett, Government Veterinary Surgeon, acted as Director of Agriculture from 22nd June, while Dr. V. Tavares was appointed to act as Veterinary Surgeon as from 1st October. These acting appointments continued to the end of the year.

Mr. L. N. H. Larter, the officer selected by the Secretary of State to fill the newly created post of Geneticist, arrived in the Island on the 25th November and assumed his duties.

Mr. E. M. Falloon was appointed an Inspector of Plant Diseases *vice* Mr. H. C. Bowen.

The following officers were granted Vacation Leave during the course of the year:—

Head Office—

Mr. G. D. Goode, Chief Clerk	5 weeks
Mr. W. E. Watson, 2nd Class Clerk	1 month
Miss I. R. Mein, Typist and Stenographer	1 month
Miss V. M. Barrows, Typist and Stenographer	4 weeks
Miss V. L. Crosskill, Temporary Clerk	1 month

Farm School—

Mr. L. A. Powell, Assistant Master, Farm School	3 weeks
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Government Laboratory—

Mr. W. H. Edwards, Government Entomologist	3 months
Mr. E. N. Richards, Assistant to Deputy Island Chemist	3 months
Mr. E. K. Blake, Technical Assistant	5 weeks

F. E. V. SMITH, B.Sc.
Actg. Director of Agriculture.

The Honourable
The Colonial Secretary,
Kingston.

